7th Edition

Rohen ▪ Yokochi ▪ Lütjen-Drecoll

Color Atlas of Anatomy

A Photographic Study of the Human Body

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Johannes W. Rohen
Chihiro Yokochi
Elke Lütjen-Drecoll

Color Atlas of Anatomy

A Photographic Study of the Human Body

Seventh Edition

Coeditions in 20 Languages

Johannes W. Rohen
Chihiro Yokochi
Elke Lütjen-Drecoll

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A Photographic Study of the Human Body

Seventh Edition

With 1211 Figures,
1117 in Color,
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Preface to the Seventh Edition

This new edition was revised and structured anew in different ways. Each chapter is provided with an introductory front page to give an overview of the topics of the chapter and short descriptions. The whole introductory chapter "General Anatomy" was newly arranged and supported with introductory texts, thus facilitating students to better understand the complicated "world" of gross anatomy. The large chapter 2 "Head and Neck" was split into 5 sub-chapters with an introductory page each. Furthermore, the drawings were revised and improved in many chapters and depicted more consistently. In most of the chapters new photographs taken from newly dissected specimens were incorporated.

The general structure and arrangement of the Atlas were maintained. The chapters of regional anatomy are consequently placed behind the systematic descriptions of the anatomical structures so that students can study – e.g. before dissecting an extremity – the systematic anatomy of bones, joints, muscles, nerves and vessels. For studying the photographs of the specimens the use of a magnifier might be helpful. The enormous plasticity of the photos is surprising, especially at higher magnifications.

In many places new MRI and CT scans were added to give consideration to the new imaging techniques which become more and more important for the student in preclinics. We would like to express our sincere thanks to Prof. Heuck, Munich, who provided us with the MRI scans.

In the underlying seventh edition photographs of the surface anatomy of the human body were included again. We omitted marks and indications in order not to affect the quality of the pictures.

Despite numerous additions and amendments the size of the volume did not increase so that students both in preclinics and in clinics are offered an atlas easy to handle and cope with.

While preparing this new edition, the authors were reminded of how precisely, beautifully, and admirably the human body is constructed. If this book helps the student or medial doctor to appreciate the overwhelming beauty of the anatomical architecture of tissues and organs in the human, then it greatly fulfils its task. Deep interest and admiration of the anatomical structures may create the "love for man", which alone can be considered of primary importance for daily medical work.

We would like to express our great gratitude to all coworkers for their skilled work. Without their help the improvements of the *Color Atlas of Anatomy* would not have been possible. We would also like to express our sincere thanks to those at Schattauer GmbH, Stuttgart, Germany, Lippincott, Williams & Wilkins, Baltimore, Maryland, USA, and Igaku-Shoin, Tokyo, Japan, who always listened to our suggestions and invested again a great deal of their effort into improving this book.

Acknowledgements

We would like to express our great gratitude to all coworkers who helped to make the *Color Atlas of Anatomy* a success. We are particularly indebted to those who dissected new specimens with great skill and knowledge, particularly to Jeff Bryant (member of our staff) and Dr. Martin Rexer (now Klinikum Fürth, Germany), who prepared most of the new specimens of the fifth, sixth and seventh edition. We would also like to thank Dr. K. Okamoto (now Nagasaki, Japan), who dissected many excellent specimens of the fourth edition, also included in the fifth edition. Furthermore, we are greatly indebted to Prof. W. Neuhuber and his coworkers for their great efforts in supporting our work.

The specimens of the previous editions also depicted in this volume were dissected with great skill and enthusiasm by Prof. Dr. S. Nagashima (now Nagasaki, Japan), Dr. Mutsuko Takahashi (now Tokyo, Japan), Dr. Gabriele Lindner-Funk (Erlangen, Germany), Dr. P. Landgraf (Erlangen, Germany), and Miss Rachel M. McDonnell (now Dallas, Texas, USA).

We are greatly indebted to Prof. Kyung Won Chung, Ph.D., Director of Medical Gross Anatomy, University of Oklahoma, USA, Dept. of Cell Biology, for his careful corrections of the proofs of the new edition.

We would also like to express our many thanks to Prof. W. Bautz (Radiologisches Institut, University Erlangen-Nürnberg, Germany) and Prof. A. Heuck (Radiologisches Zentrum, München-Pasing, Germany), who provided the newly included excellent CT and MRI scans.

We are also greatly indebted to Mr. Hans Sommer (SOMSO Co., Coburg, Germany), who kindly provided a number of excellent bone specimens.

Finally, we would like to express our great gratitude to our photographer, Mr. Marco Gößwein, who contributed the very excellent macrophotos. Excellent and untiring work was done by our secretaries, Mrs. Lisa Köhler and Elisabeth Wascher, and as well by our artists, Mr. Jörg Pekarsky and Mrs. Annette Gack, who not only performed excellent new drawings but revised effectively the layout of the new edition.

Last but not least, we would like to express our sincere thanks to all scientists, students, and other coworkers, particularly to the ones at the publishing companies themselves.

Erlangen, Germany; Spring 2010

J. W. Rohen
C. Yokochi
E. Lütjen-Drecoll

Preface to the First Edition

Today there exist any number of good anatomic atlases. Consequently, the advent of a new work requires justification. We found three main reasons to undertake the publication of such a book.

First of all, most of the previous atlases contain mainly schematic or semischematic drawings which often reflect reality only in a limited way; the third dimension, i.e., the spatial effect, is lacking. In contrast, the photo of the actual anatomic specimen has the advantage of conveying the reality of the object with its proportions and spatial dimensions in a more exact and realistic manner than the "idealized", colored "nice" drawings of most previous atlases. Furthermore, the photo of the human specimen corresponds to the student's observations and needs in the dissection courses. Thus he has the advantage of immediate orientation by photographic specimens while working with the cadaver.

Secondly, some of the existing atlases are classified by systemic rather than regional aspects. As a result, the student needs several books each supplying the necessary facts for a certain region of the body. The present atlas, however, tries to portray macroscopic anatomy with regard to the regional and stratigraphic aspects of the object itself as realistically as possible. Hence it is an immediate help during the dissection courses in the study of medical and dental anatomy.

Another intention of the authors was to limit the subject to the essential and to offer it didactically in a way that is self-explanatory. To all regions of the body we added schematic drawings of the main tributaries of nerves and vessels, of the course and mechanism of the muscles, of the nomenclature of the various regions, etc. This will enhance the understanding of the details seen in the photographs. The complicated architecture of the skull bones, for example, was not presented in a descriptive way, but rather through a series of figures revealing the mosaic of bones by adding one bone to another, so that ultimately the composition of skull bones can be more easily understood.

Finally, the authors also considered the present situation in medical education. On one hand there is a universal lack of cadavers in many departments of anatomy, while on the other hand there has been a considerable increase in the number of students almost everywhere. As a consequence, students do not have access to sufficient illustrative material for their anatomic studies. Of course, photos can never replace the immediate observation, but we think the use of a macroscopic photo instead of a painted, mostly idealized picture is more appropriate and is an improvement in anatomic study over drawings alone.

The majority of the specimens depicted in the atlas were prepared by the authors either in the Dept. of Anatomy in Erlangen, Germany, or in the Dept. of Anatomy, Kanagawa Dental College, Yokosuka, Japan. The specimens of the chapter on the neck and those of the spinal cord demonstrating the dorsal branches of the spinal nerves were prepared by Dr. K. Schmidt with great skill and enthusiasm. The specimens of the ligaments of the vertebral column were prepared by Dr. Th. Mokrusch, and a great number of specimens in the chapter of the upper and lower limb was very carefully prepared by Dr. S. Nagashima, Kurume, Japan.

Once again, our warmest thanks go out to all of our coworkers for their unselfish, devoted and highly qualified work.

Erlangen, Germany; Spring 1983

J. W. Rohen
C. Yokochi

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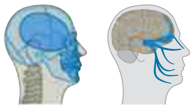

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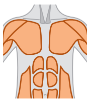

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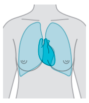

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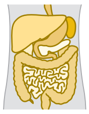

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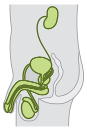

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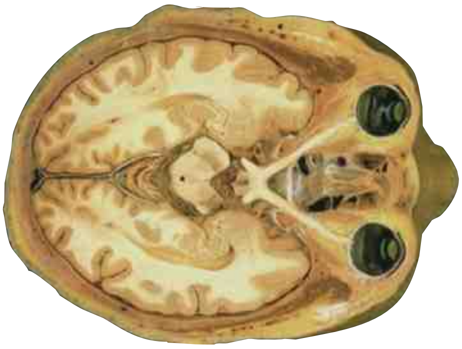
1 General Anatomy

Three general principles are recognizable in the architecture of the human organism:

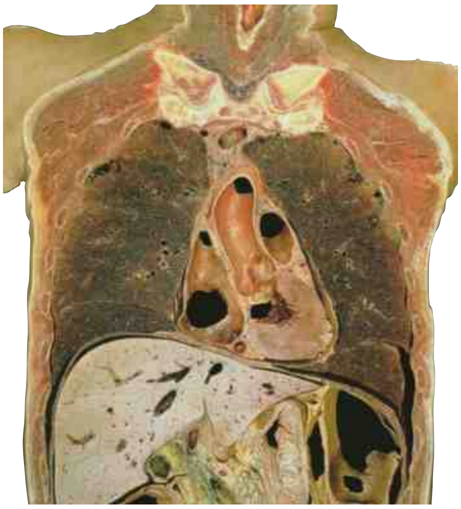
1. **The principle of polarity:** Polarity is reflected mainly in the formal and functional contrast between the head (predominantly spherical form) and the extremities (radially arranged skeletal elements). In the phylogenetic development of the upright position of the human body, polarity developed also among the extremities: The lower extremities provide the basis for locomotion whereas the upper extremities are not needed anymore for locomotion, so they can be used for gesture, manual and artistic activities.
2. **The principle of segmentation:** This principle dominates in the trunk. The anatomical structures (vertebrae, pairs of ribs, muscles, and nerves) are arranged segmentally and replicate rhythmically in a similar way.
3. **The principle of bilateral symmetry:** Both sides of the body are separated by a midsagittal plane and resemble each other like image and mirror-image.



Horizontal section through the head at the level of the eyes.

There are also different principles in the architecture and function of the inner organs:

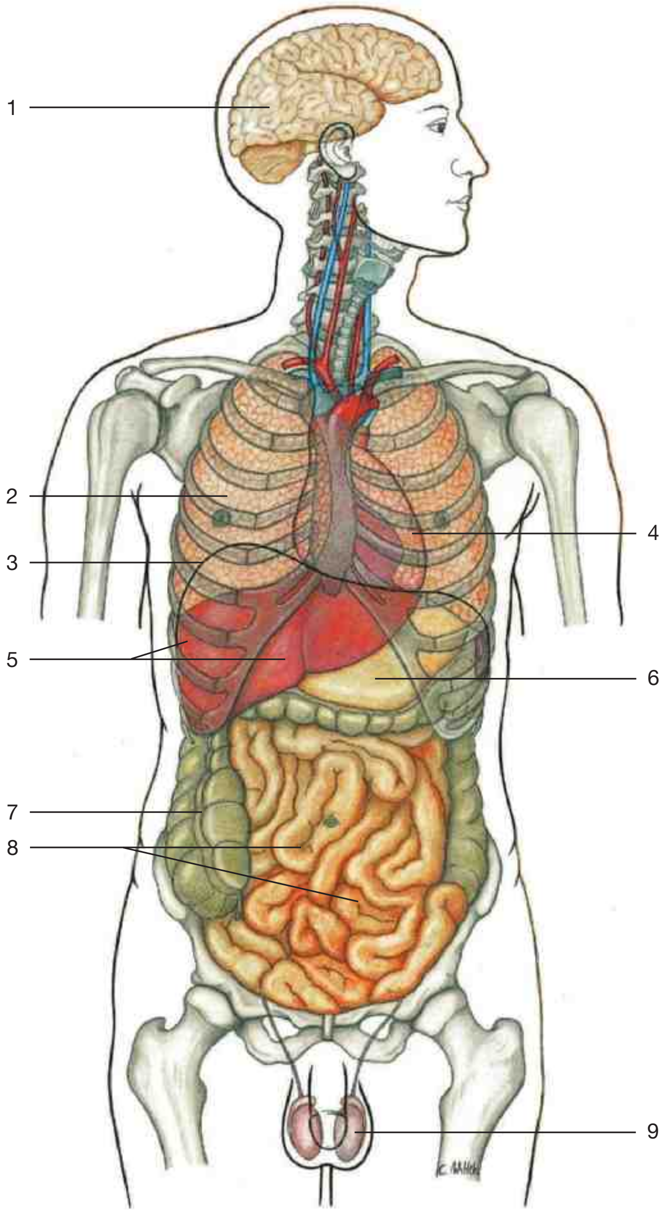
The **skull** contains the brain and the sensory organs. They are arranged like mirror and mirror-image and are the basis of our consciousness.



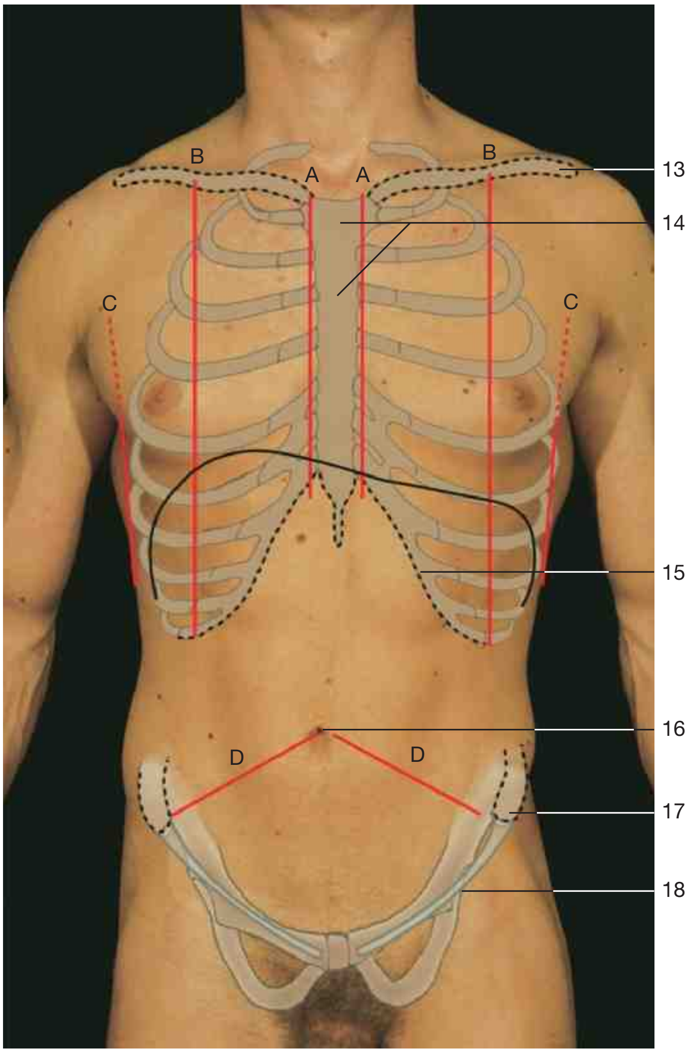
Coronal section through the thoracic and abdominal cavity.

The **thorax** contains the organs of the rhythmic system (heart, lung), which are only to some extent bilaterally organized. The consciousness (feeling, etc.) is located in-between.

In the **abdominal cavity,** the most important abdominal organs (intestinal tract, liver, pancreas) are arranged unpaired. Their functions remain subconscious.



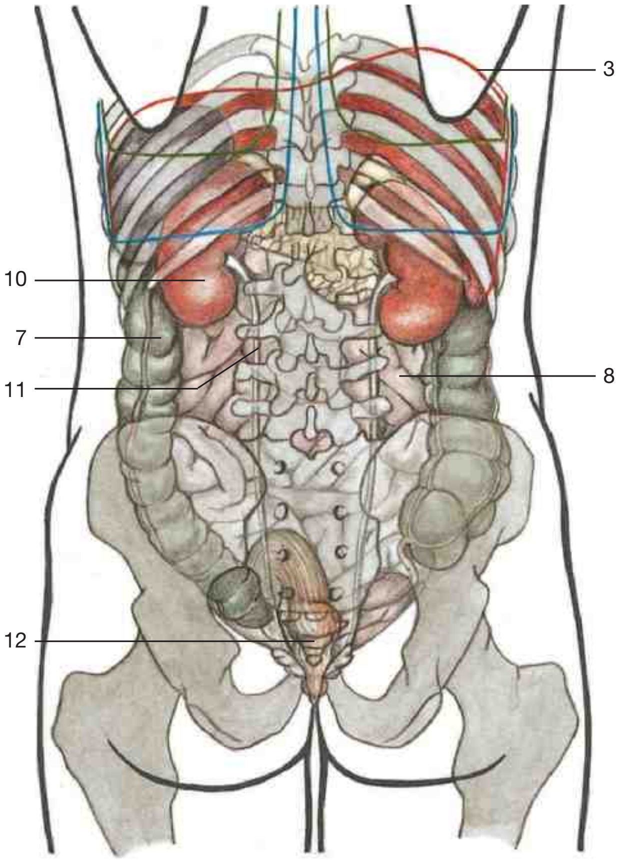
Position of the inner organs of the human body (anterior aspect). The main cavities of the body and their contents.



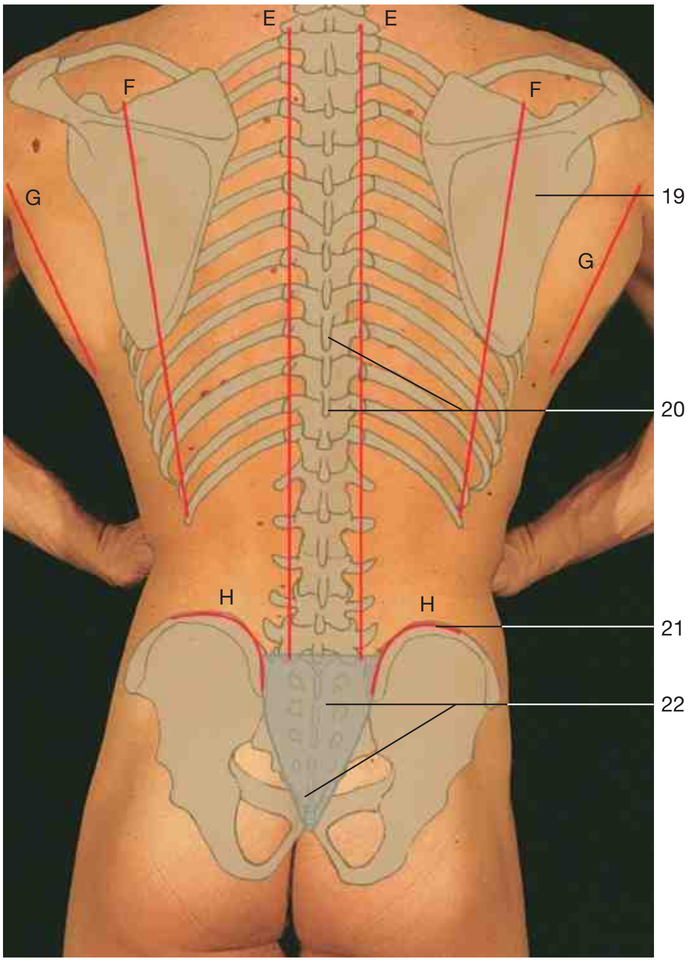
Regional lines and palpable points at the ventral side of the human body.

Regional lines
A = parasternal line
B = midclavicular line
C = anterior axillary line
D = umbilical-pelvic line

The bones of the skeletal system are palpable through the skin at different points. This enables physicians to localize the inner organs. On the **ventral side,** the clavicle, sternum, ribs, and intercostal spaces are palpable. Furthermore, the anterior iliac spine and the symphysis can be localized. For better orientation, several **lines of orientation** are used, e.g., the parasternal line, the midclavicular line, the anterior axillary line, the umbilical-pelvic line.
By means of these lines, the heart and the position of the vermiform process can be localized.



Position of the inner organs of the human body (posterior aspect).

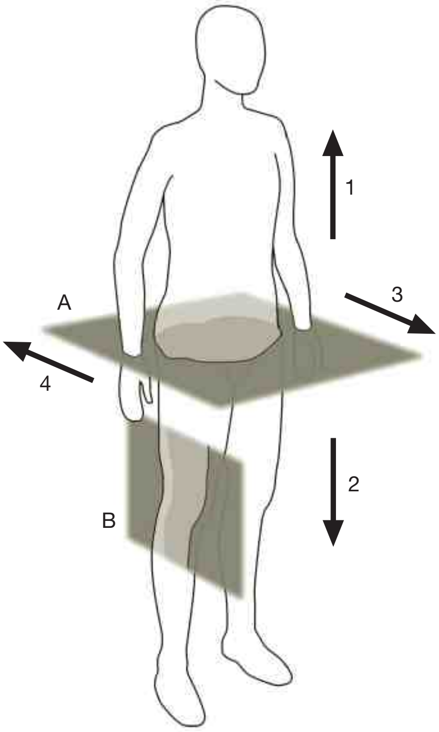


Regional lines and palpable points at the dorsal side of the human body.

Regional lines
E = paravertebral line
F = scapular line
G = posterior axillary line
H = iliac crest

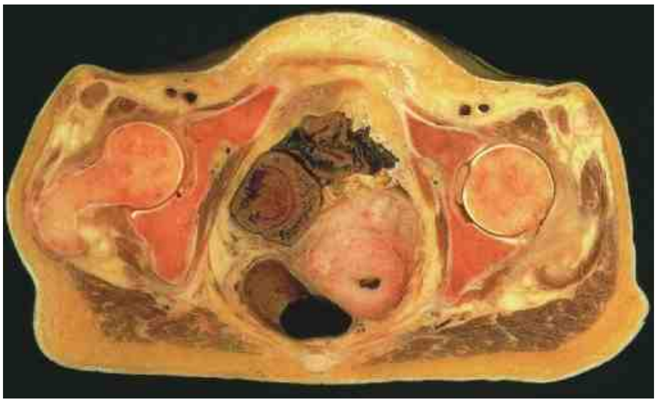
1	Brain
2	Lung
3	Diaphragm
4	Heart
5	Liver
6	Stomach
7	Colon
8	Small intestine
9	Testis
10	Kidney
11	Ureter
12	Anal canal
13	Clavicle
14	Manubrium sterni
15	Costal arch
16	Umbilicus
17	Anterior superior iliac spine
18	Inguinal ligament
19	Scapular spine
20	Spinous processes
21	Iliac crest
22	Coccyx and sacrum

At the **dorsal side** of the body, the posterior spines of the vertebral column, the ribs, the scapula, the sacrum, and the iliac crest are palpable. **Lines of orientation** are the paravertebral line, the scapular line, the posterior axillary line, and the iliac crest.

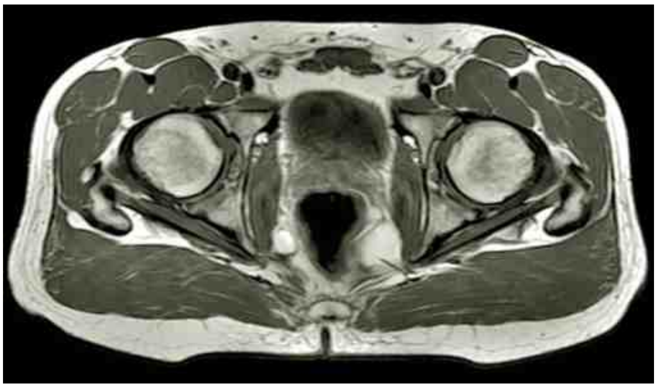


Planes of the body:
A = horizontal or axial or transverse plane
B = sagittal plane (at the level of the knee joint)

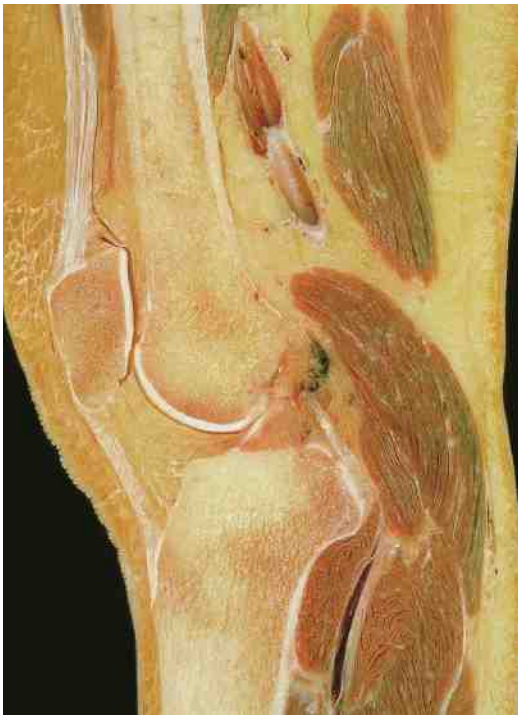
Directions:
1 = cranial
2 = caudal
3 = anterior (ventral)
4 = posterior (dorsal)



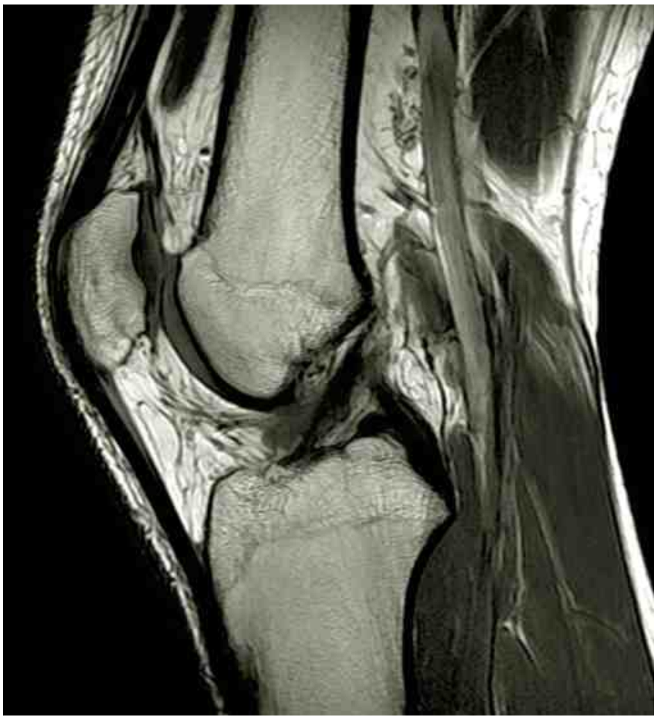
Horizontal section through the pelvic cavity and the hip joints.



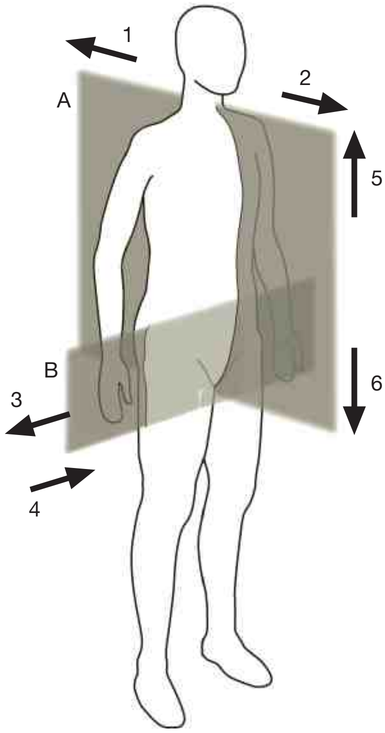
MRI scan through the pelvic cavity and the hip joints (horizontal or axial or transverse plane).



Sagittal section through the knee joint.



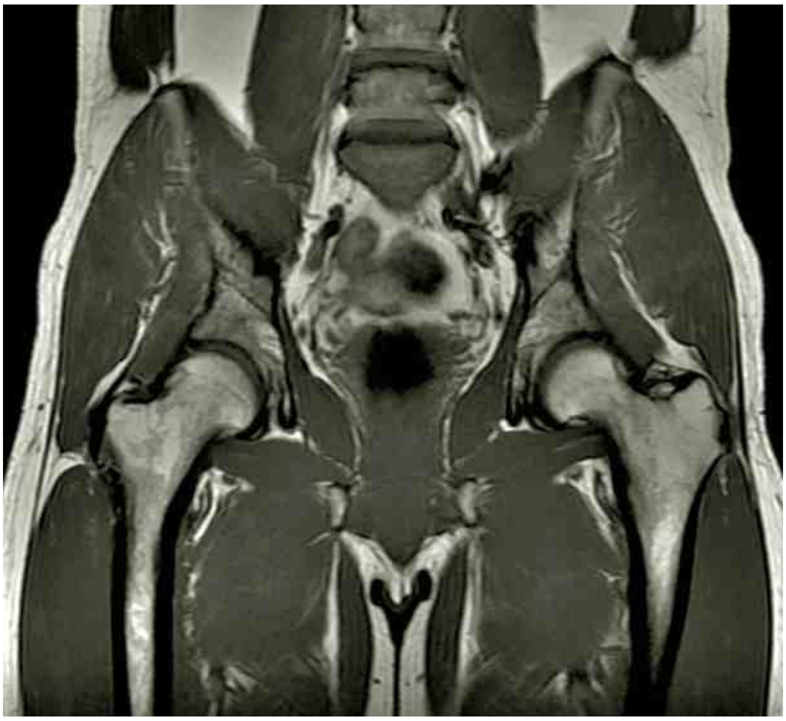
MRI scan through the knee joint (sagittal plane).



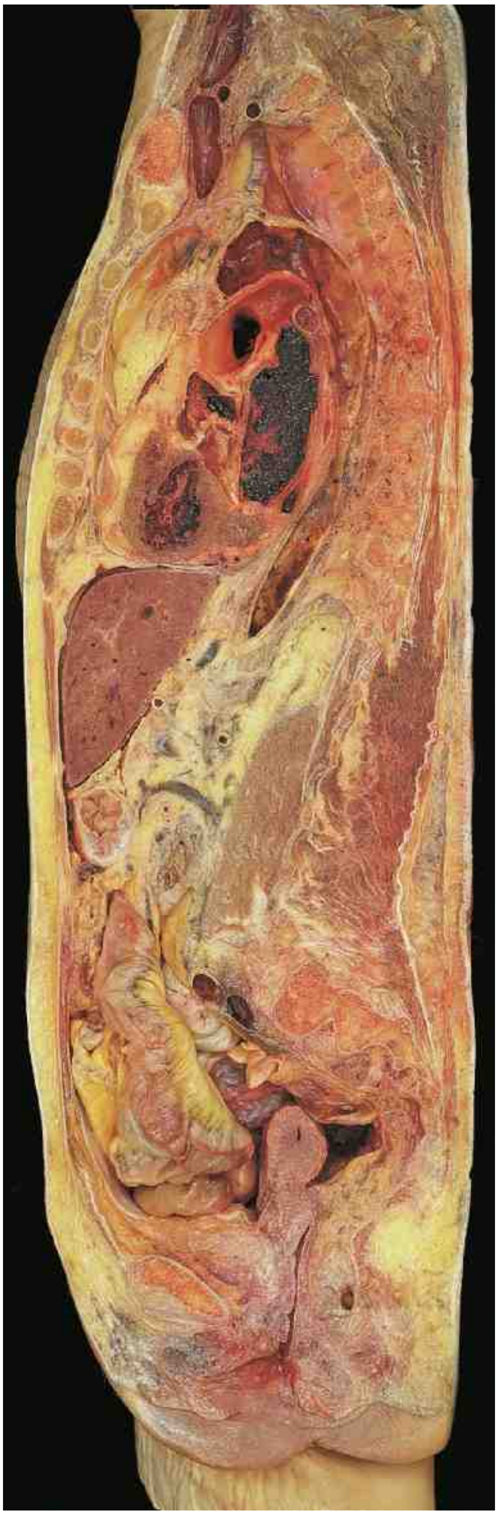
Planes of the body:
A = midsagittal or median plane
B = frontal or coronal plane (through the pelvic cavity)

Directions:

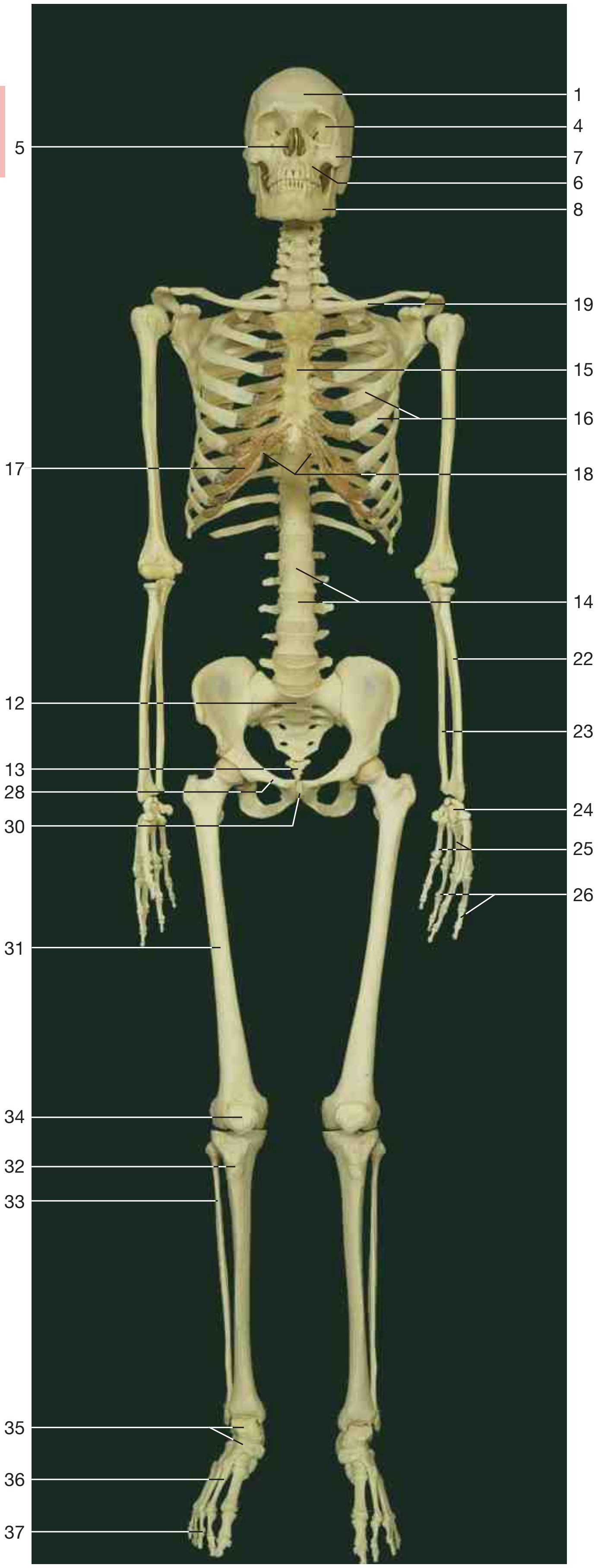
1 = posterior (dorsal)	4 = medial
2 = anterior (ventral)	5 = cranial
3 = lateral	6 = caudal



MRI scan through the pelvic cavity and the hip joints (frontal or coronal plane).



Median section through the trunk of a female.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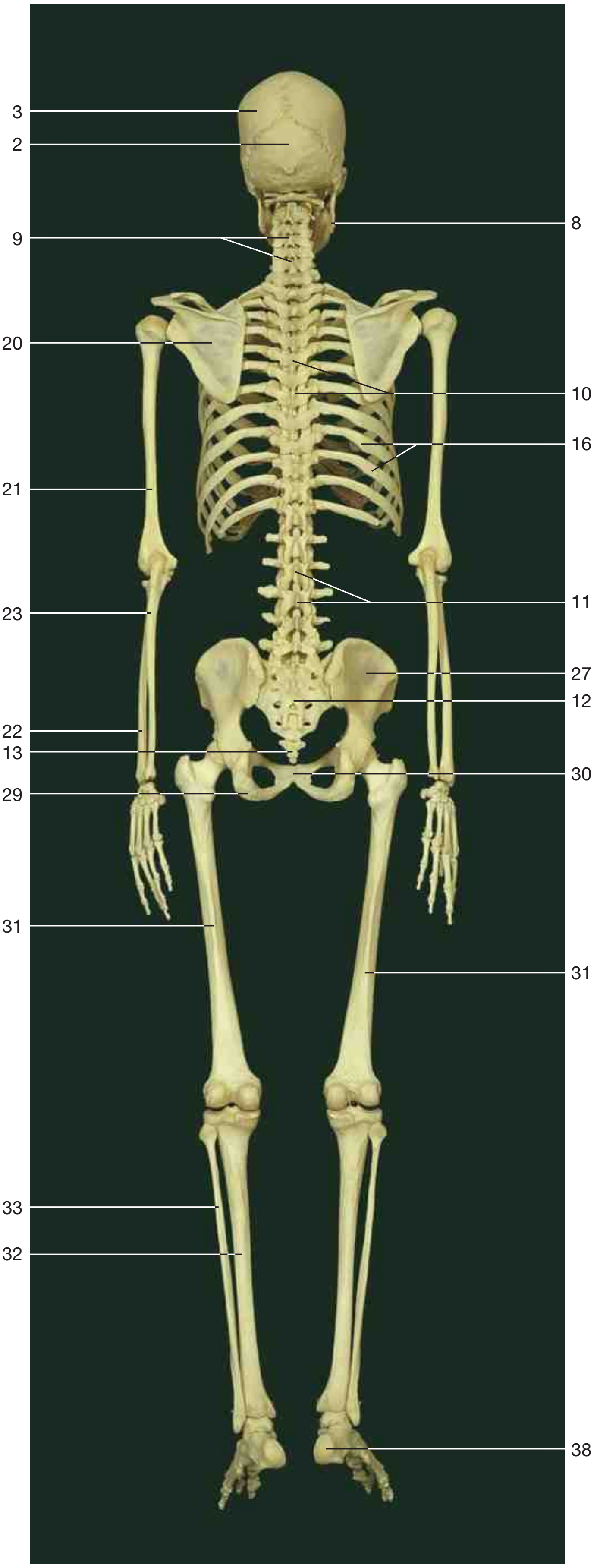
Skeleton of a female adult (anterior aspect).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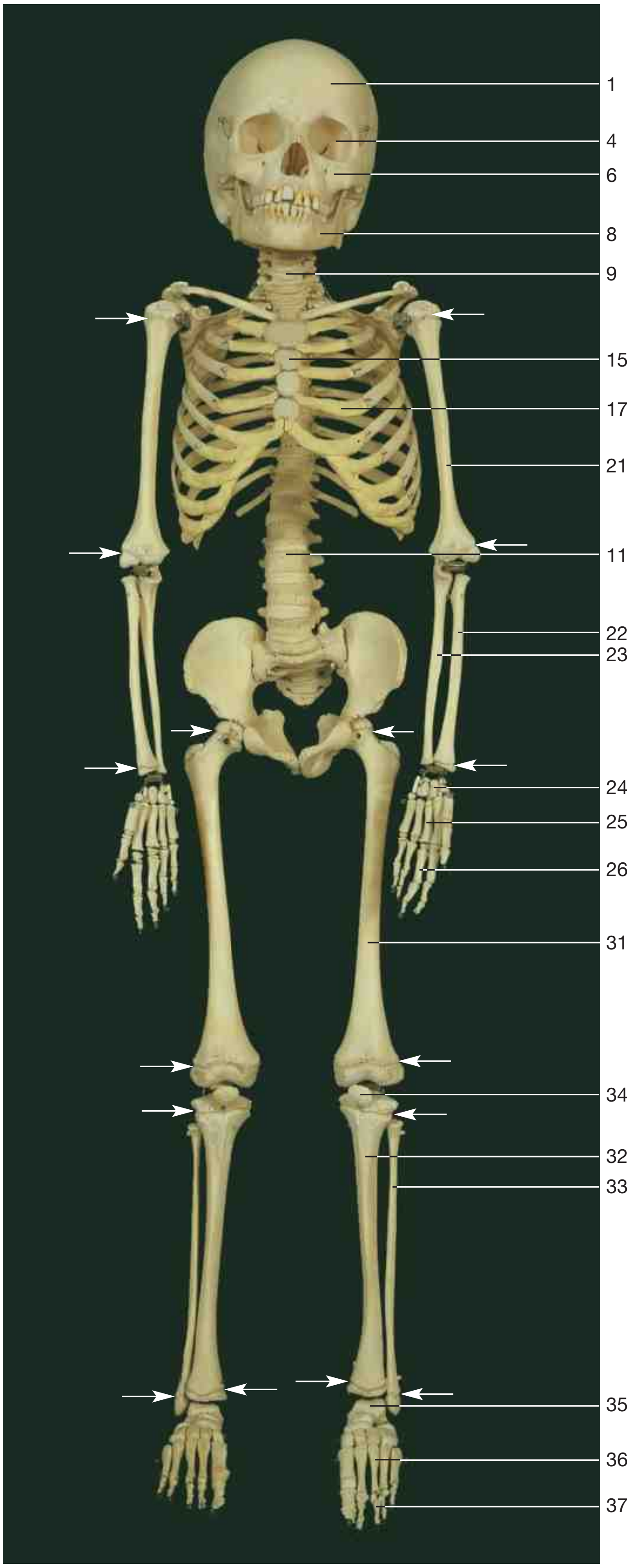
Skeleton of a female adult (posterior aspect).



Skeleton of a 5-year-old child (anterior aspect).
The zones of the cartilaginous growth plates are seen (arrows).
In contrast to the adult, the ribs show a predominantly horizontal position.

Axial skeleton

Head

1	Frontal bone
2	Occipital bone
3	Parietal bone
4	Orbit
5	Nasal cavity
6	Maxilla
7	Zygomatic bone
8	Mandible

Trunk and thorax

Vertebral column

9	Cervical vertebrae
10	Thoracic vertebrae
11	Lumbar vertebrae
12	Sacrum
13	Coccyx
14	Intervertebral discs

Thorax

15	Sternum
16	Ribs
17	Costal cartilage
18	Infrasternal angle

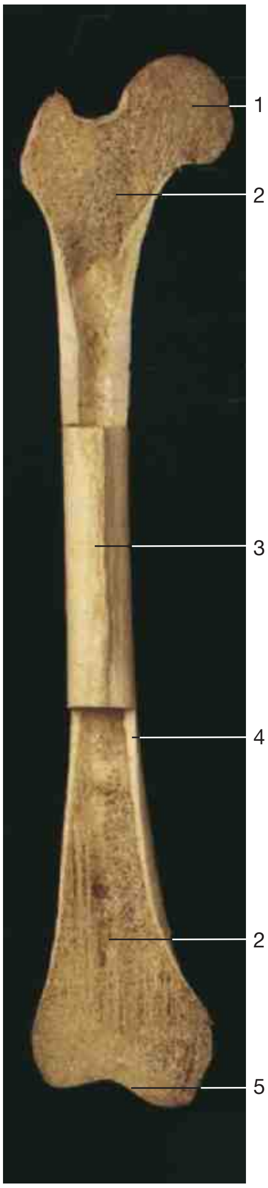
Appendicular skeleton

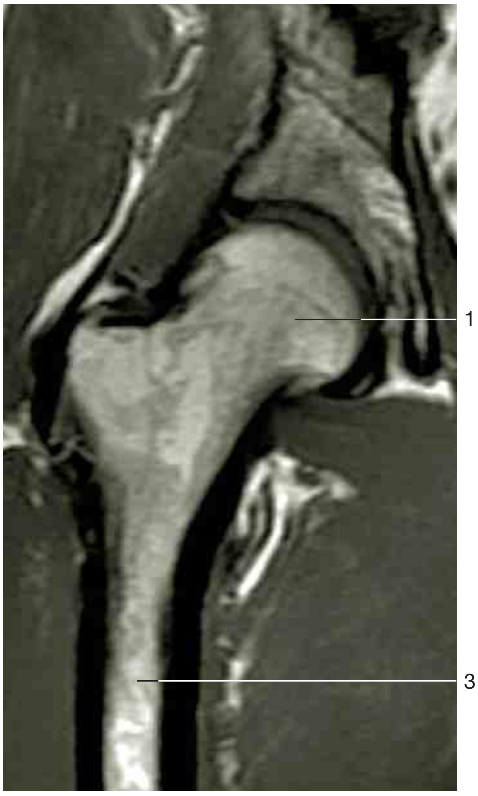
Upper limb and shoulder girdle

19	Clavicle
20	Scapula
21	Humerus
22	Radius
23	Ulna
24	Carpal bones
25	Metacarpal bones
26	Phalanges of the hand

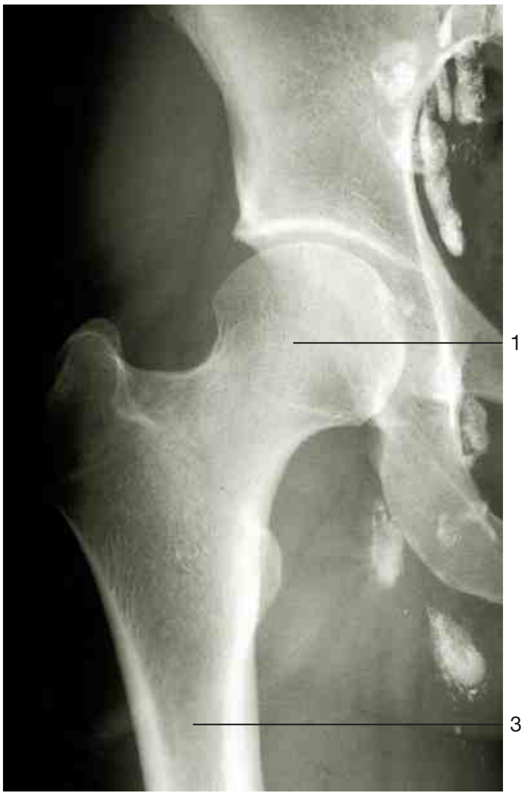
Lower limb and pelvis

27	Ilium
28	Pubis
29	Ischium
30	Symphysis pubis
31	Femur
32	Tibia
33	Fibula
34	Patella
35	Tarsal bones
36	Metatarsal bones
37	Phalanges of the foot
38	Calcaneus





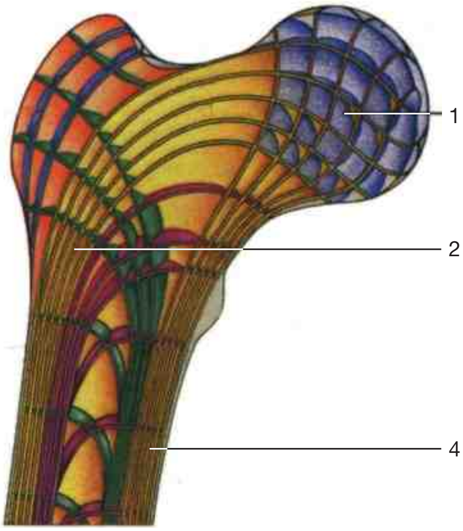
MRI scan of the right femur and the hip joint (coronal section) (from Heuck et al., MRT-Atlas, 2009).



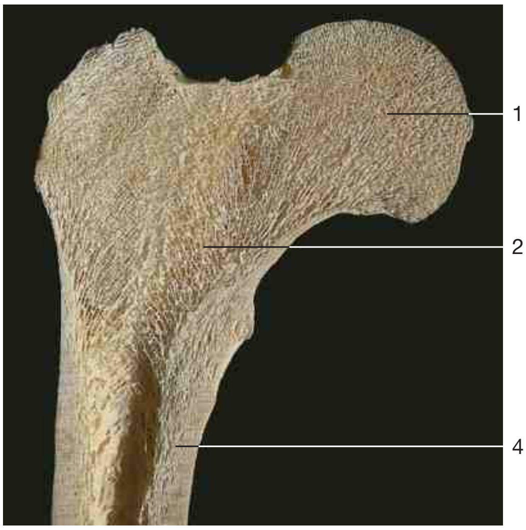
X-ray of the right femur and the hip joint (a.-p. direction).

◁ **Femur of the adult.** Coronal section of the proximal and distal epiphyses displaying the spongy bone and the medullary cavity.

1 Head of the femur
2 Spongy bone
3 Diaphysis of the femur
4 Compact bone
5 Articular cartilage

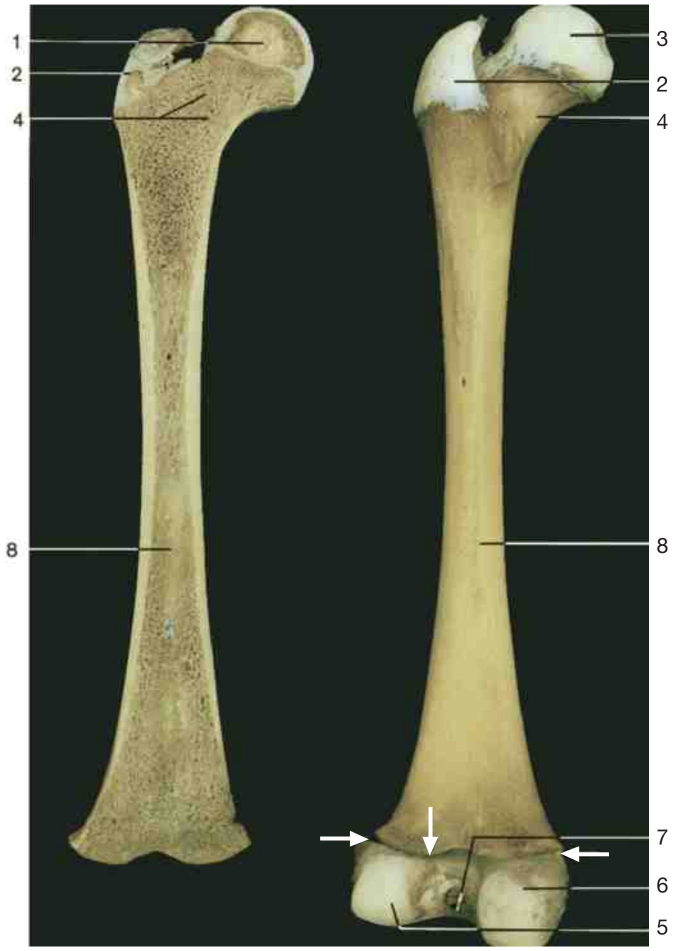


Three-dimensional representation on the trajectorial lines of the femoral head (according to B. Kummer).



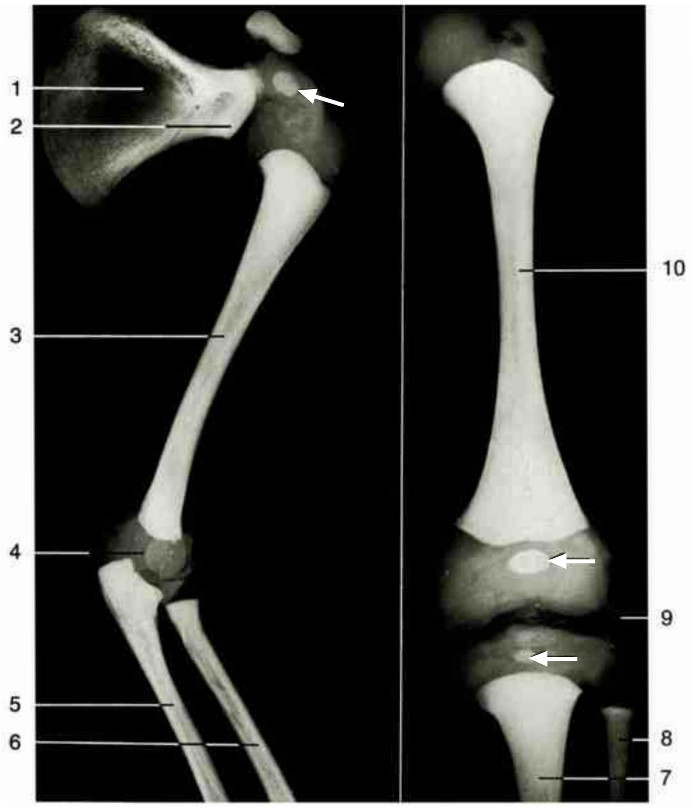
Coronal section through the proximal end of the adult femur showing the characteristic structure of the spongy bone.

The **ossification of the bones** of the limbs starts within the ossification centers of the primary cartilagenous bones. Here, the medullary cavity develops. The ossification process of limb bones is not finished at birth.



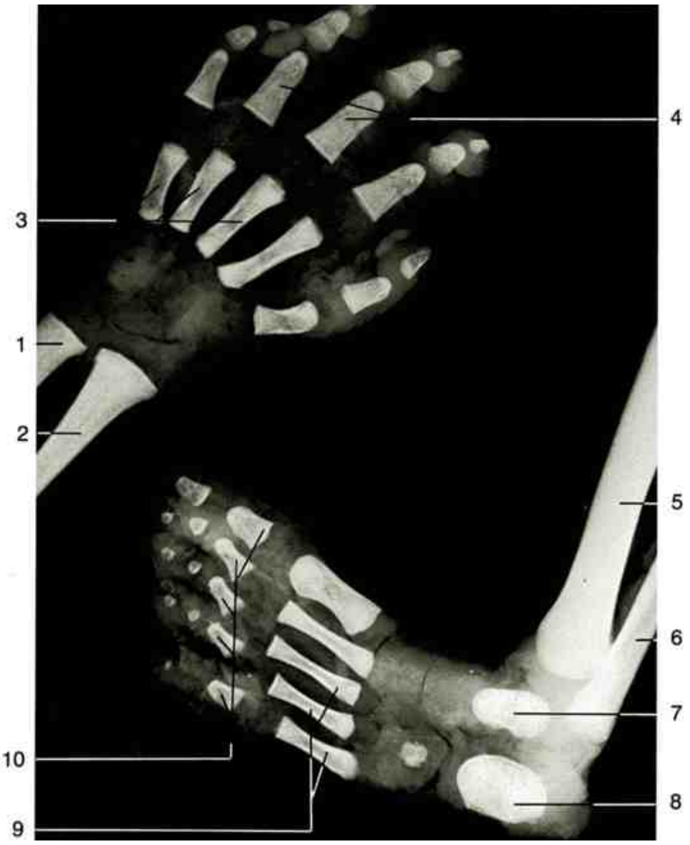
Ossification of the femur (left: coronal section, right: posterior view of the femur). Arrows: distal epiphysis.

◁ 1 Ossification center in the head of the femur
2 Greater trochanter
3 Head of the femur
4 Neck of the femur
5 Lateral condyle
6 Medial condyle
7 Intercondylar notch
8 Diaphysis



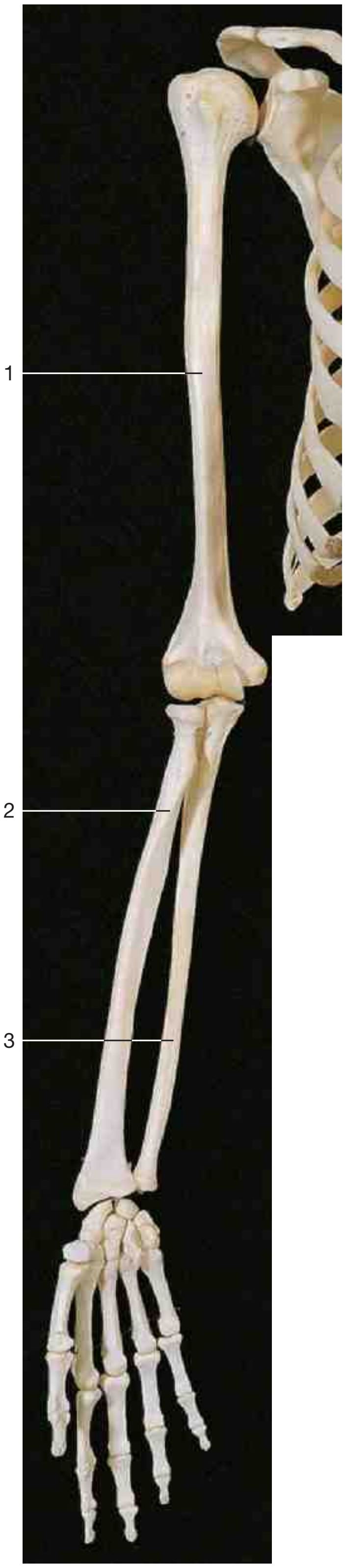
X-ray of the upper and lower limb of a newborn child (left: upper limb, right: lower limb). Arrows: ossification centers.

1 Scapula
2 Shoulder joint
3 Humerus
4 Elbow joint
5 Ulna
6 Radius
7 Tibia
8 Fibula
9 Knee joint
10 Femur

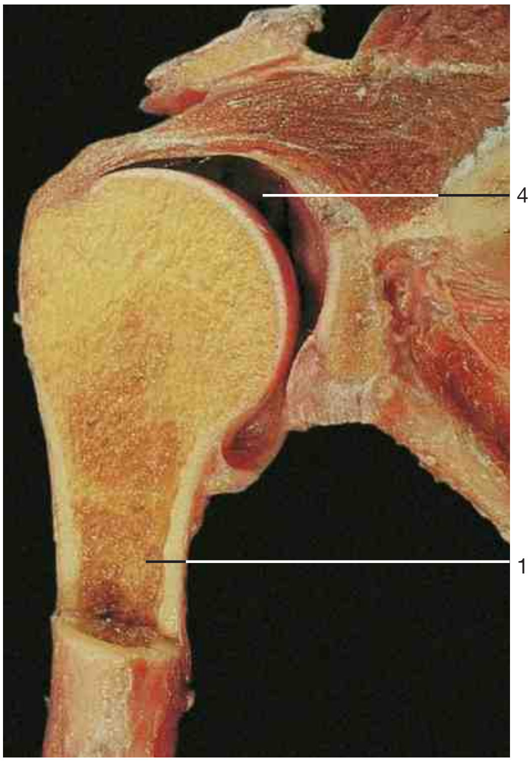


◁ 1 Ulna
2 Radius
3 Metacarpals
4 Phalanges
5 Tibia
6 Fibula
7 Talus
8 Calcaneus
9 Metatarsals
10 Phalanges

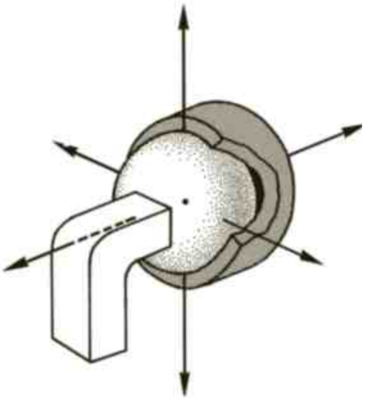
X-ray of hand and foot of a newborn.



Skeleton of the right arm and shoulder girdle (anterior aspect).

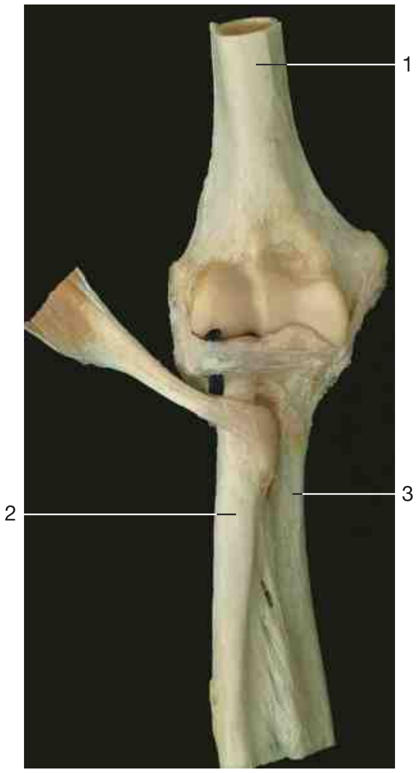


Shoulder joint as an example of a multiaxial ball-and-socket joint (coronal section).

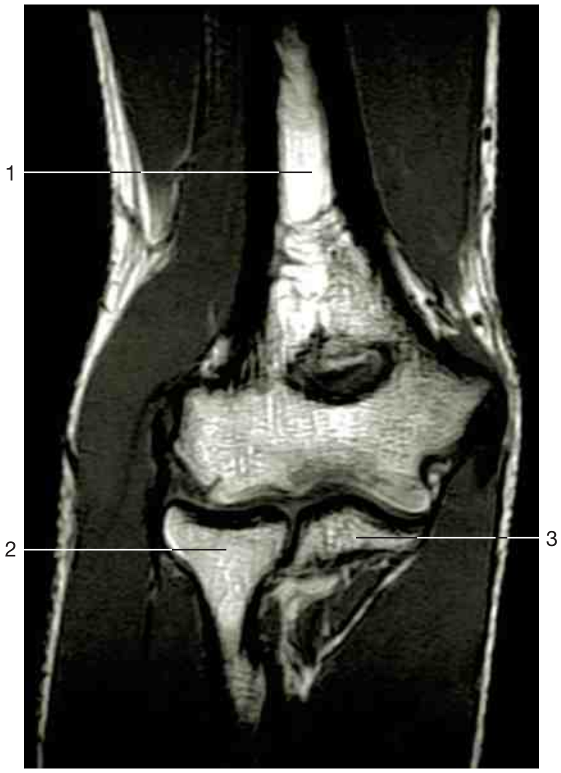


Ball-and-socket joint with its different axes (schematic drawing). Arrows: axes of movement.

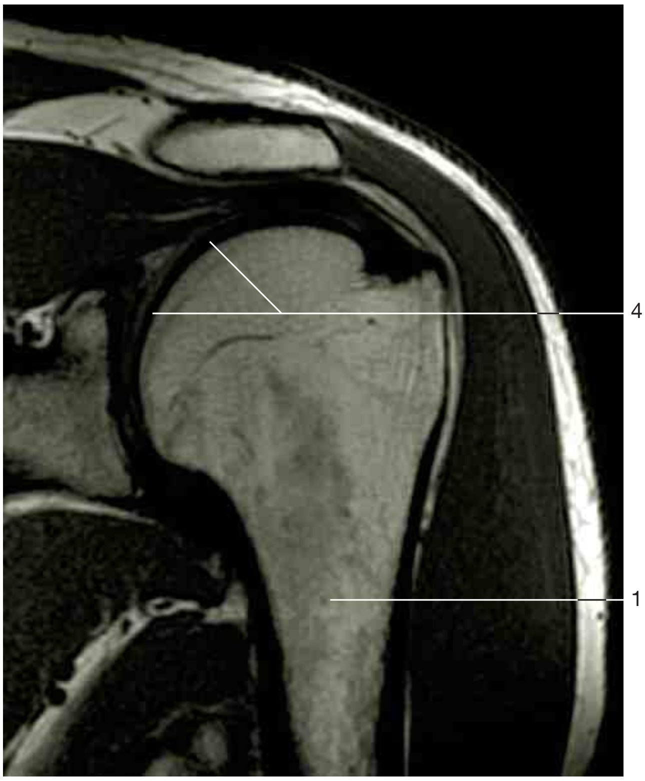
1 Humerus
2 Radius
3 Ulna
4 Articular cavity (shoulder joint)
5 Metacarpophalangeal joint
6 Joints of fingers



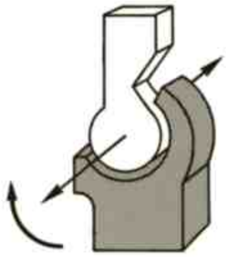
Elbow joint with ligaments as an example of a hinge joint (monaxial humero-ulnar joint) in combination with a pivot joint (monaxial radio-ulnar joint), which allows rotation.

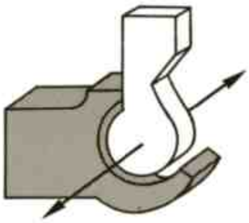


Coronal section of the elbow joint (MRI scan, courtesy of Prof. Heuck, Munich). The possibilities of movement are shown in the schematic drawings on p. 11.

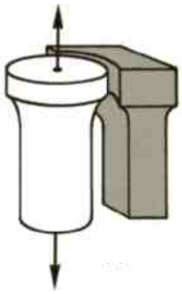


Coronal section of the shoulder joint
(MRI scan, from Heuck et al., MRT-Atlas, 2009).

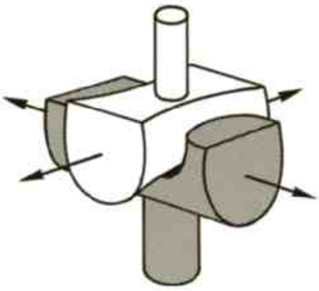




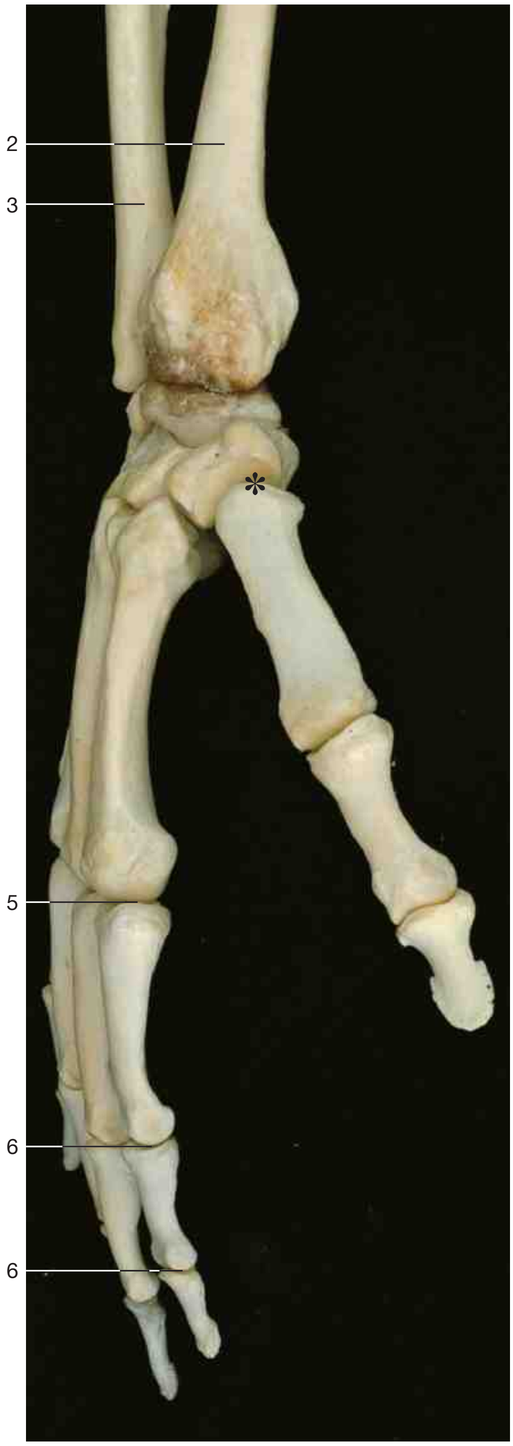
Hinge joint
(e.g. humero-ulnar joint). Left: extension, right: flexion.
Arrows: axes of movement.



Pivot joint
(e.g. radio-ulnar joint).

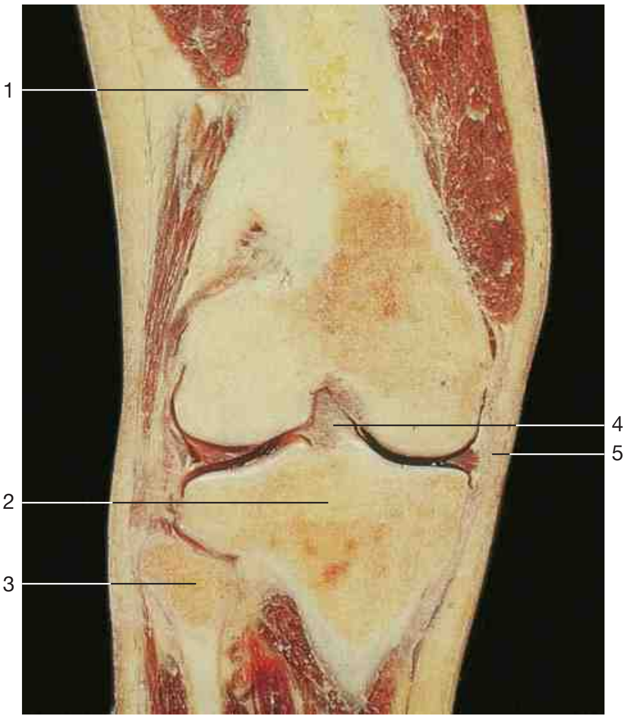


Saddle joint
(e.g. carpometacarpal joint of the thumb).

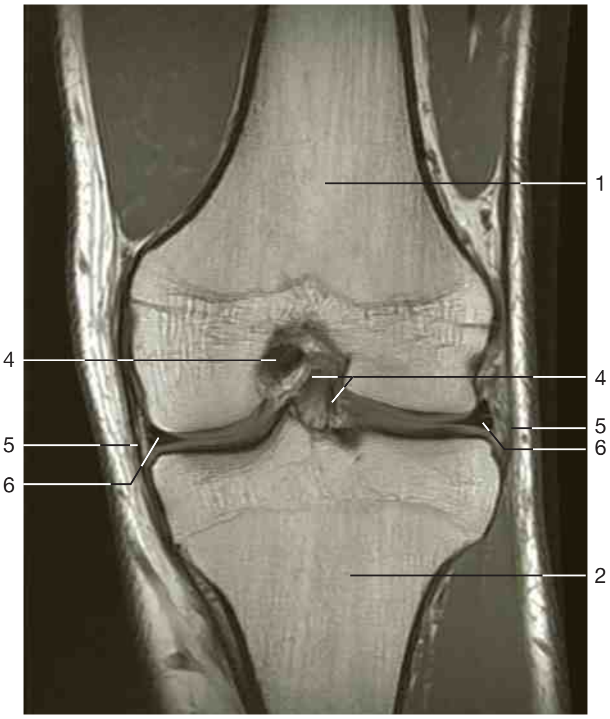


Skeleton of right wrist and hand (medial aspect). The metacarpophalangeal joints are biaxial, as is the carpometacarpal joint of the thumb (* in the figure). The joints of the fingers, however, are monaxial.

Joints exhibit a variety of functions. In general, mobility becomes reduced in the direction from proximal to distal. The hip joint, e.g., is multiaxial; the knee joint is biaxial, and the joints of toes and fingers are monaxial.



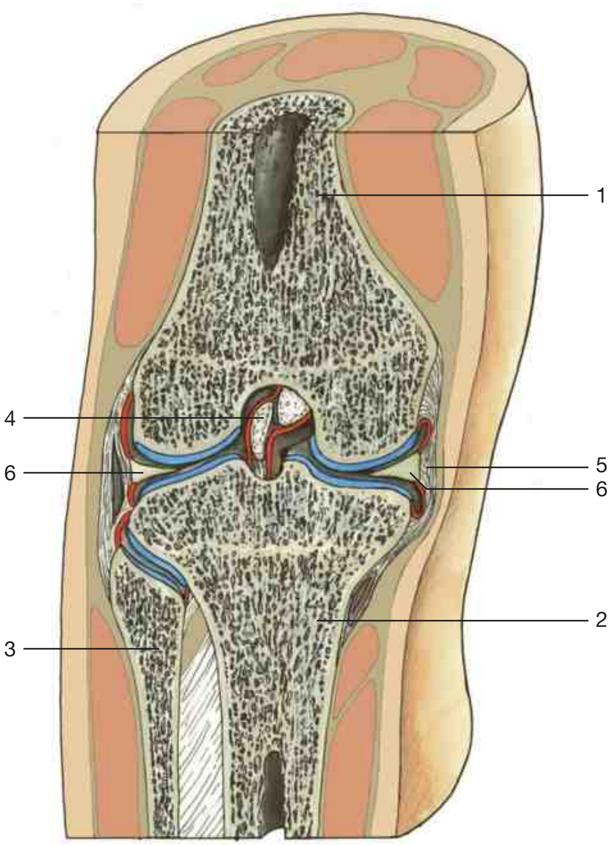
Coronal section through the knee joint (anterior aspect of the right joint in extension).



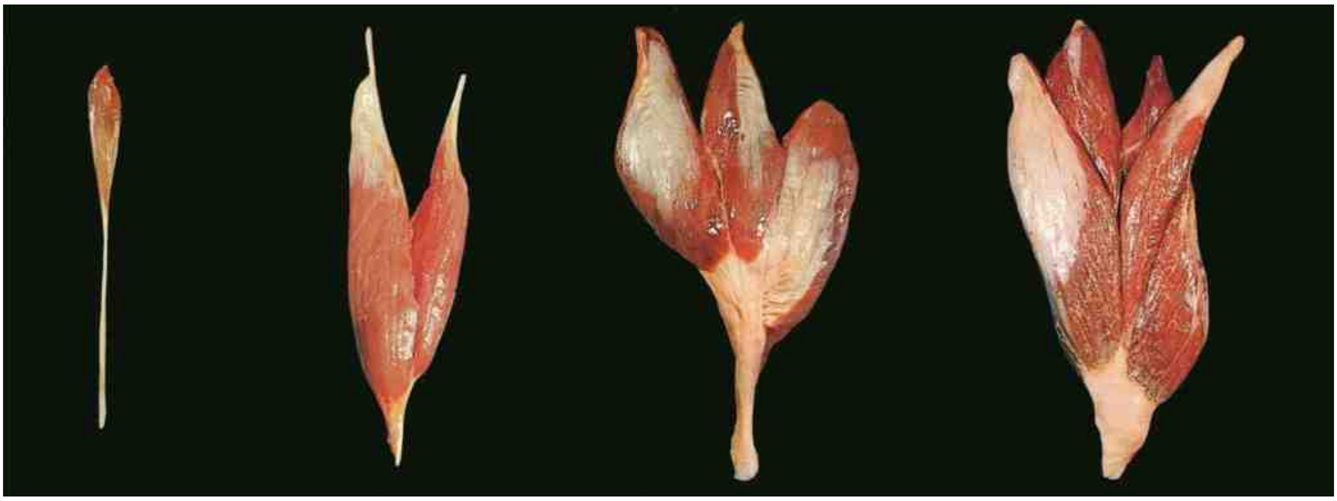
MRI scan of the knee joint (coronal plane) (from Heuck et al., MRT-Atlas, 2009).

1	Femur
2	Tibia
3	Fibula
4	Cruciate ligaments
5	Collateral ligaments
6	Meniscus

Joints are places of articulation allowing movements between bones. Synovial joints are characterized by a joint cavity enclosed by a joint capsule containing synovial fluid, which is produced by the articular capsule. The kind of movements depends not only on form and structure of the articulating bones but also on ligaments incorporated into the articular capsule. In some synovial joints, fibrocartilagenous articular discs develop, when the articulating surfaces of the bones are incongruous.



Schematic drawing of the knee joint as an example of a synovial joint, characterized by a joint cavity enclosed by a joint capsule (red) containing synovial fluid. Blue = articular cartilage.

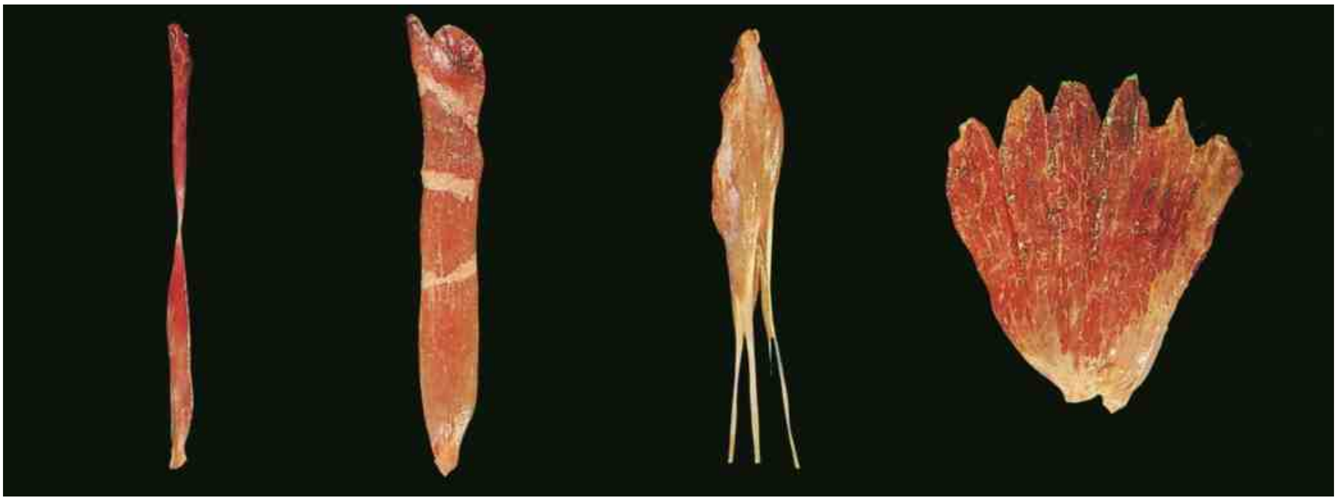


Fusiform
(palmaris longus)

Bicipital
(biceps brachii)

Tricipital (triceps surae,
gastrocnemius, and soleus)

Quadricipital
(quadriceps femoris)

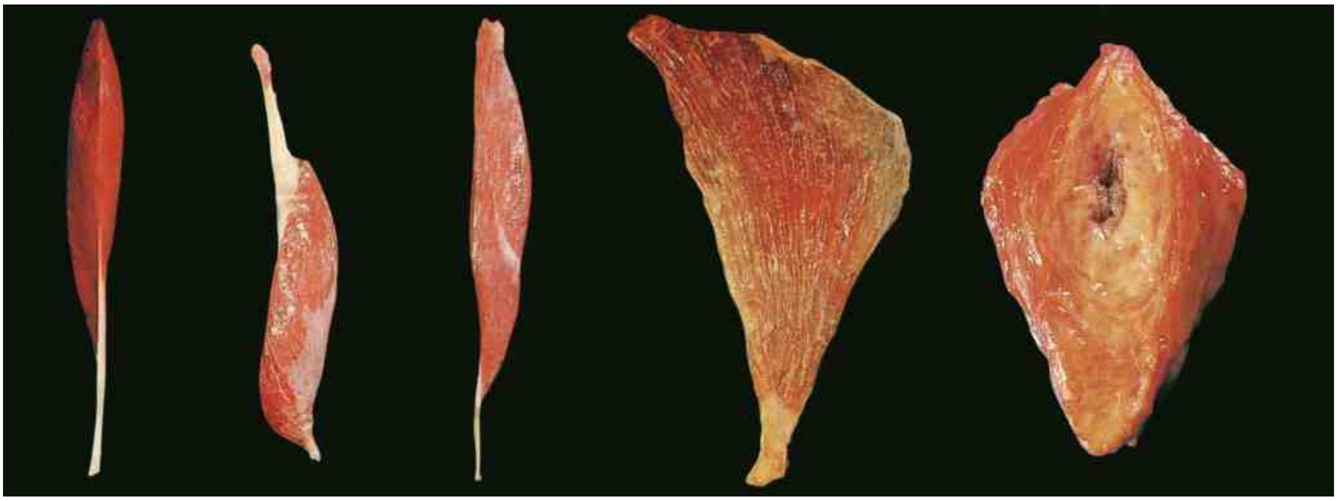


Digastric
(omohyoideus)

Multiventral
(rectus abdominis)

Multicaudal
(flexor digitorum prof.)

Serrated
(serratus anterior)



Bipennate
(tibialis anterior)

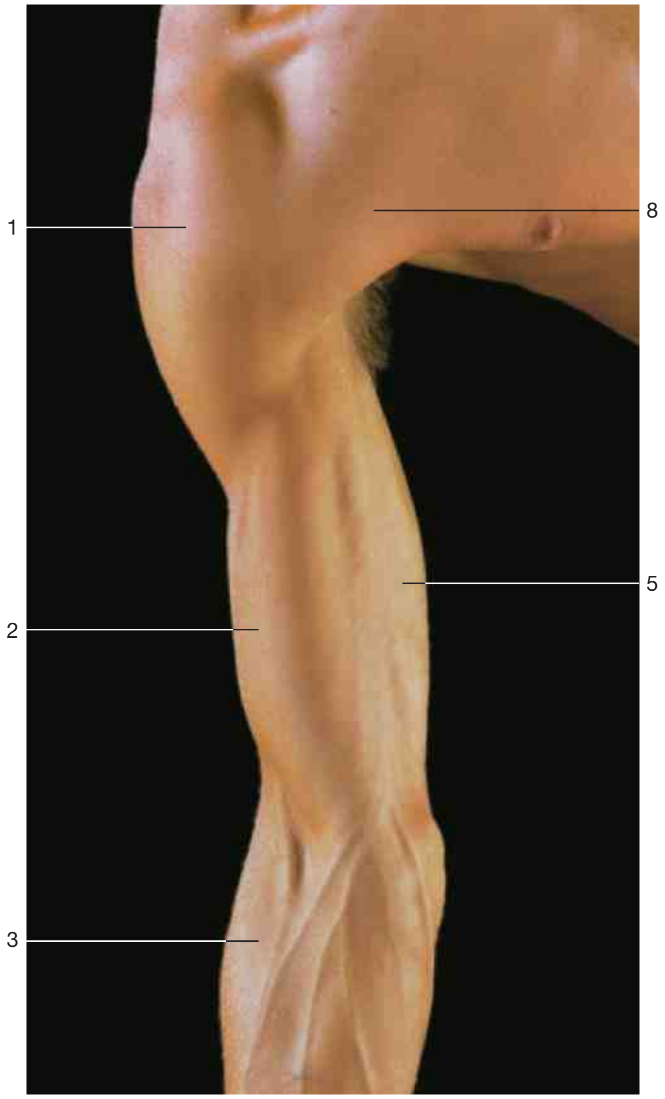
Unipennate
(semimembranosus)

Semitendinous
(semitendinosus)

Broad, flat muscle
(latissimus dorsi)

Ring-like
(sphincter ani externus)

The human body possesses **a great variety of muscles.** The architecture of the muscles depends on the functional systems in which they are involved, i.e., the kind of movements, the form of the joints with their specific ligaments, etc. The movements themselves vary to a great extent individually.



Ventral aspect of the right arm. The biceps muscle appears slightly contracted. In the area of the elbow joint, several subcutaneous veins can be recognized.

1	Deltoid muscle
2	Biceps brachii muscle
3	Brachioradialis muscle
4	Humerus
5	Triceps brachii muscle
6	Elbow joint
7	Brachialis muscle
8	Pectoralis major muscle
9	Radius
10	Ulna

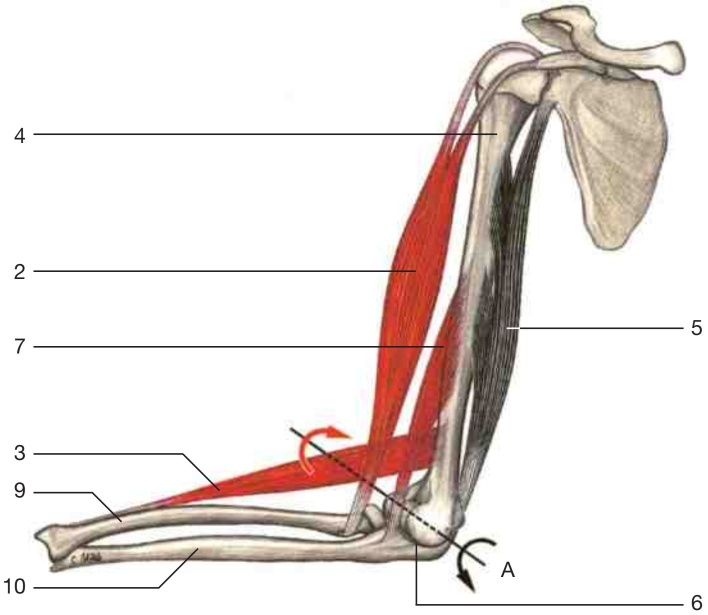
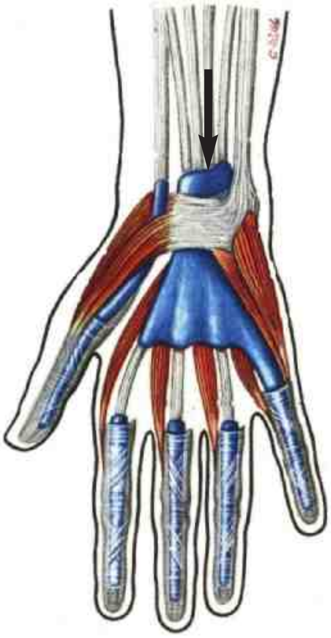
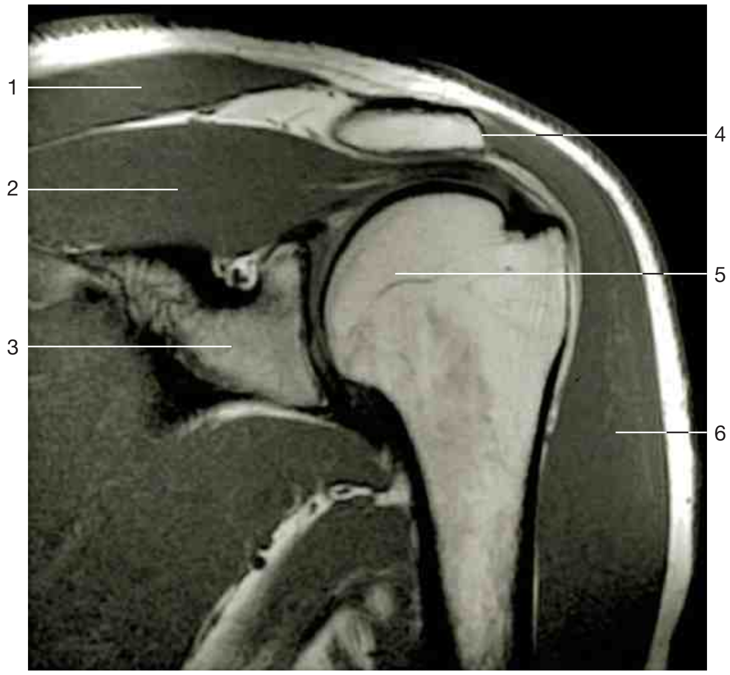


Diagram illustrating the position of the flexor and extensor muscles of the arm and their effect on the elbow joint.
A = axis of humero-ulnar joint; arrows = direction of movements; red = flexion; black = extension.

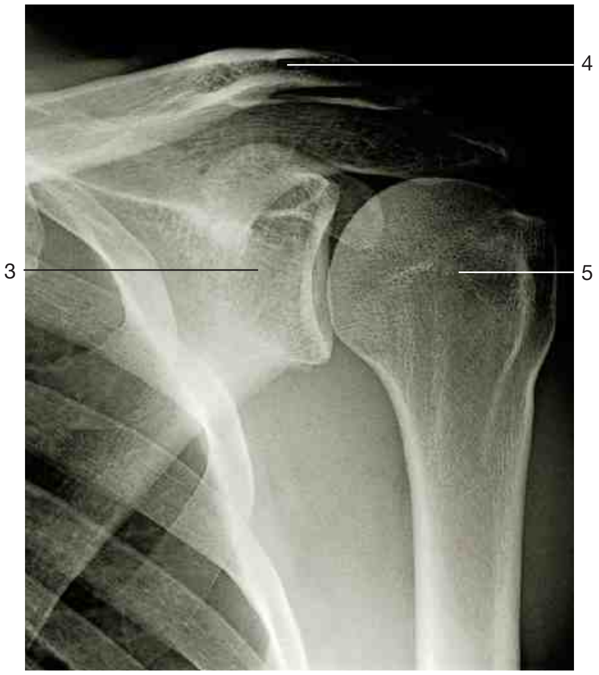


Synovial sheaths of flexor tendons (palmar aspect of right hand, semischematic drawing). **The flexor retinaculum** protects the flexor tendons passing through the carpal tunnel (arrow).

Joints are moved by muscles. The highly differentiated movements are coordinated by special groups of muscles (**synergists**). Their counterparts are called **antagonists**. Movements can only be carried out harmoniously if the contraction of the synergists are supported by a corresponding dilatation of the antagonists. This interaction is controlled by the nervous system. In order to carry out certain directions of movements, often the tendons of muscles have to be directed by ligaments. At those places, the tendons often develop synovial sheaths, e.g., at the wrist joint or at the fingers.

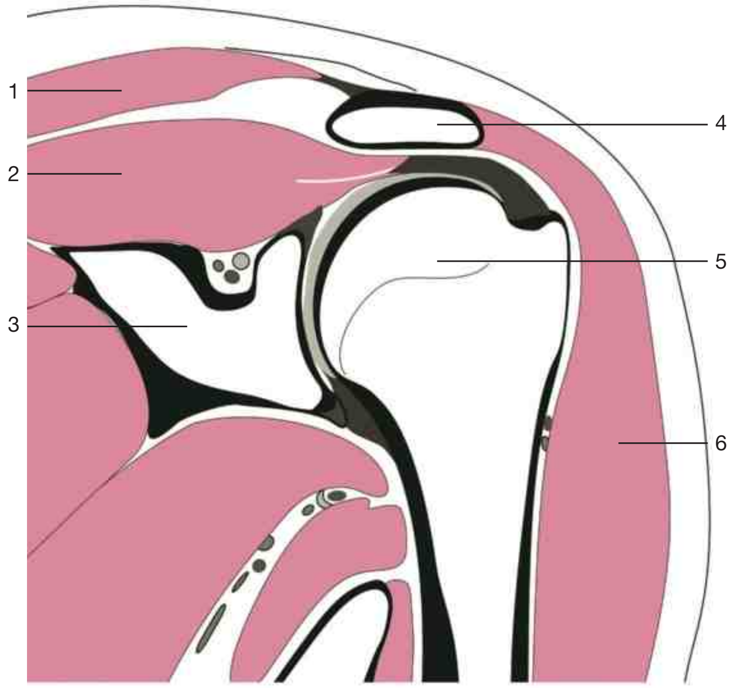


Shoulder joint (MRI scan, coronal section) (from Heuck et al., MRT-Atlas, 2009).

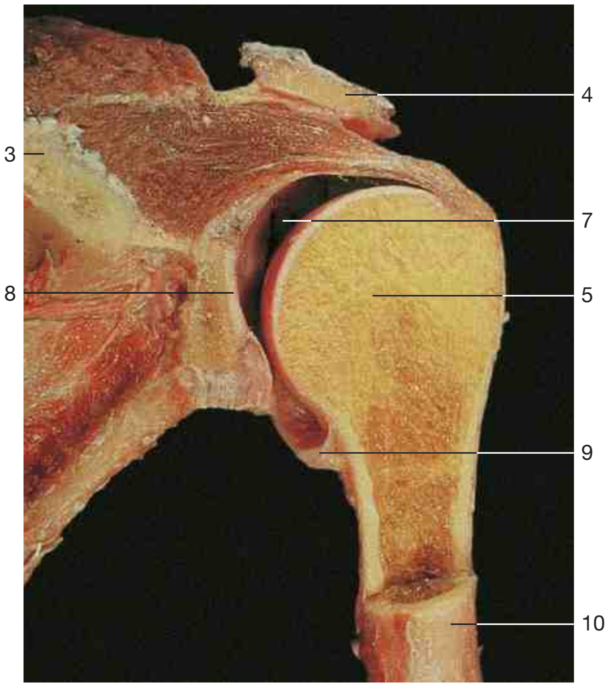


Shoulder joint (X-ray, a.-p. direction) (courtesy of Dr. Holik, Spardorf).

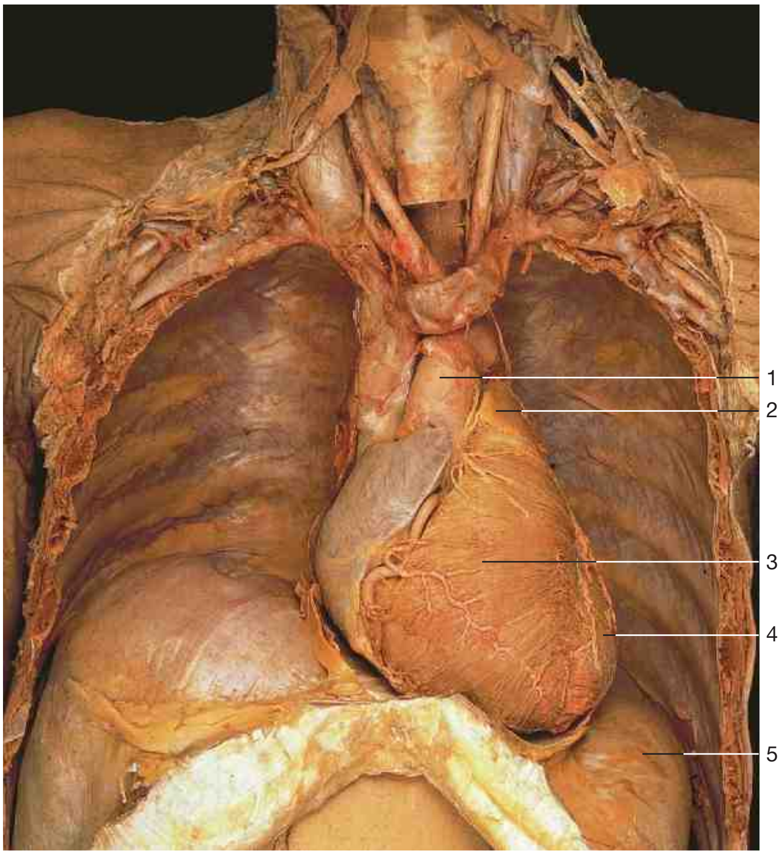
1 Trapezius muscle
2 Supraspinatus muscle
3 Scapula
4 Acromion
5 Head of humerus
6 Deltoid muscle
7 Cavity of shoulder joint
8 Articular cartilage
9 Articular cavity
10 Humerus



Shoulder joint (schematic drawing of the MRI scan above) (from Heuck et al., MRT-Atlas, 2009).

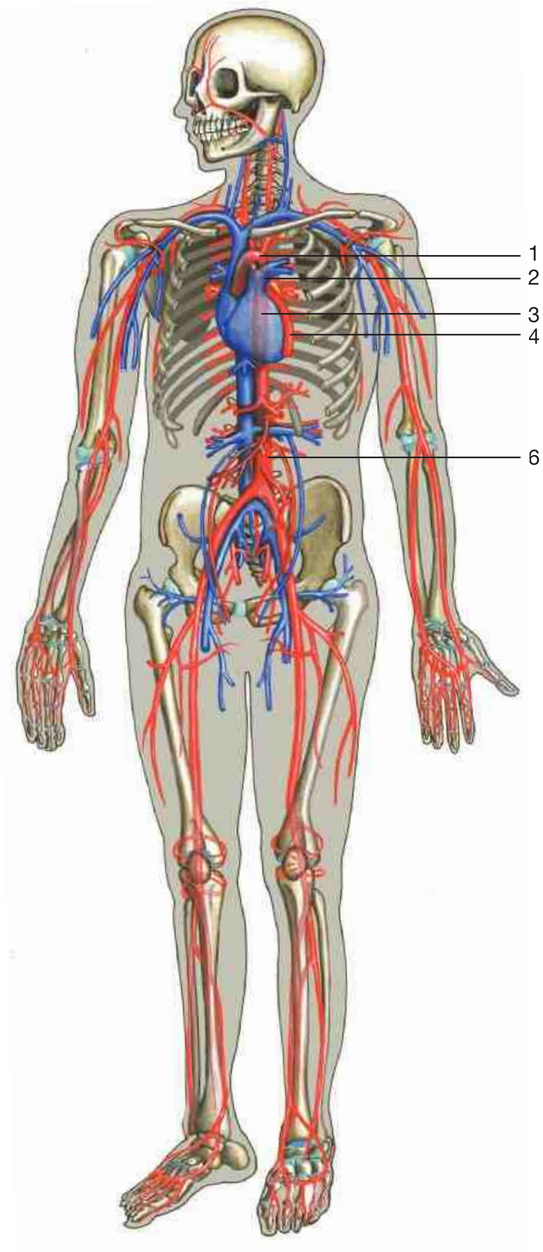


Frontal section of the shoulder joint (compare with the two pictures above).

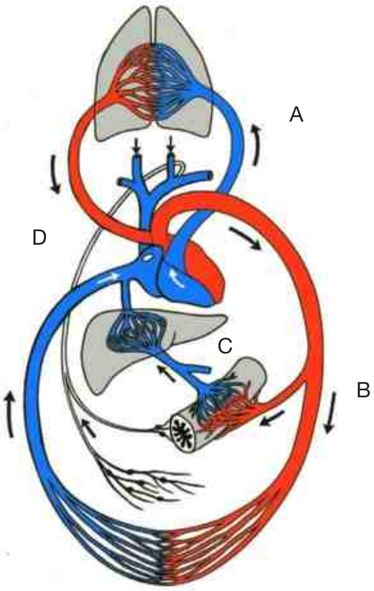


Heart and related vessels in situ (anterior aspect). Anterior thoracic wall, pericardium, and epicardium have been removed. The trachea is divided.

1 Aorta
2 Pulmonary artery
3 Right heart
4 Left heart
5 Diaphragm
6 Abdominal aorta



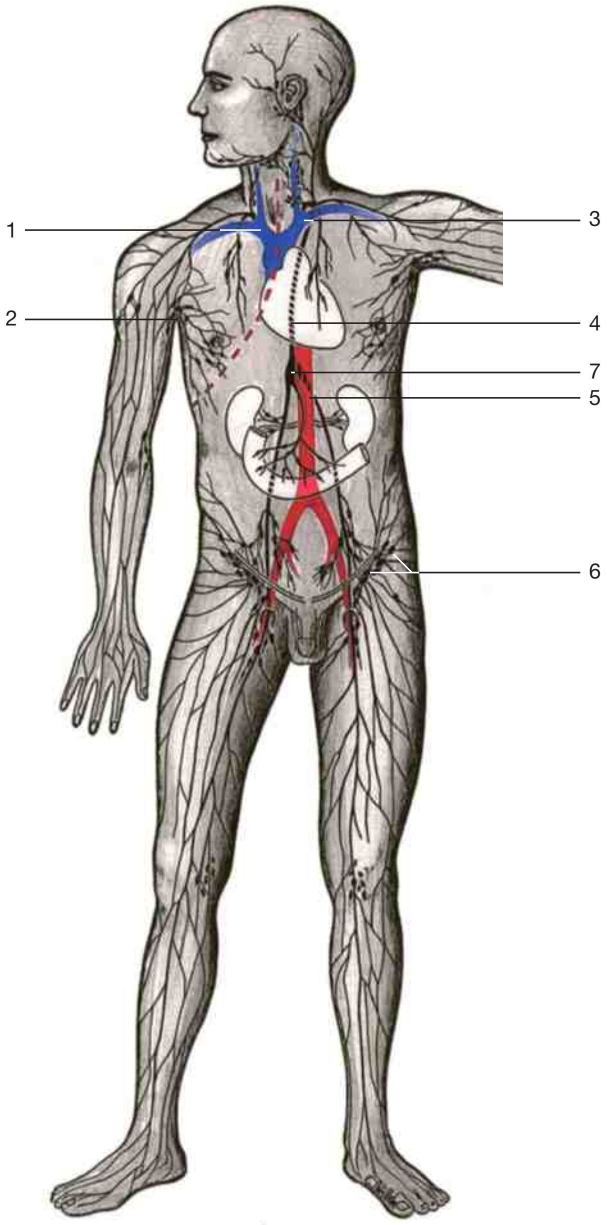
Organization of the circulatory system with the heart in the center. Red = arteries; blue = veins (from Lütjen-Drecoll, Rohen, Innenansichten des menschlichen Körpers, 2010).



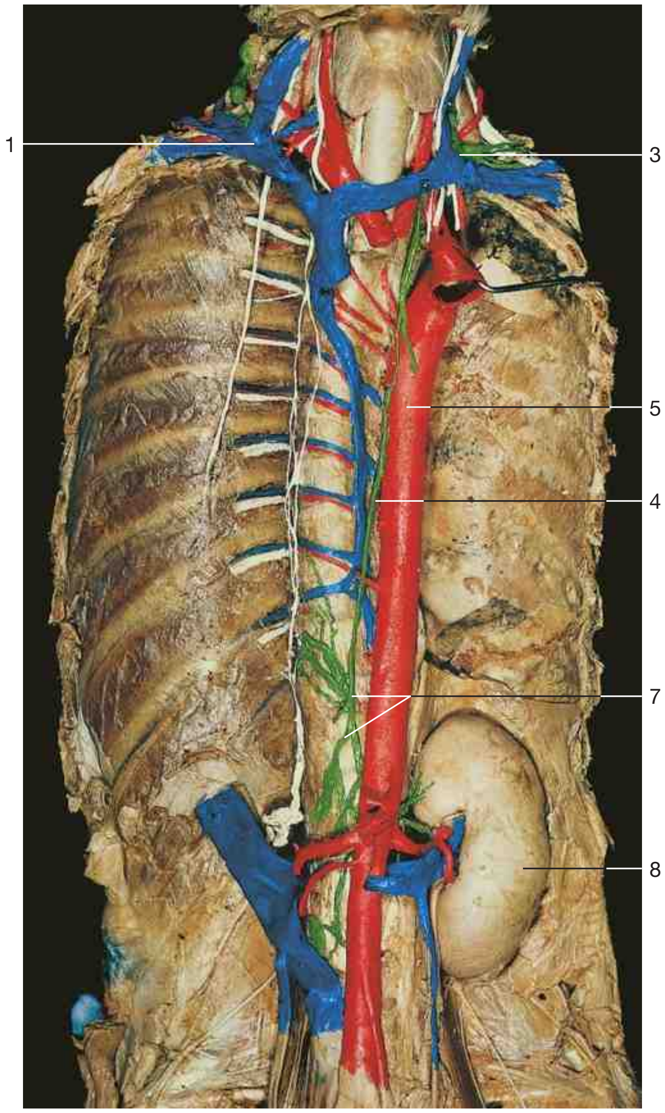
Organization of the circulatory systems in the human body. The center of this system represents the heart. Red = arteries; blue = veins (from Lütjen-Drecoll, Rohen, Innenansichten des menschlichen Körpers, 2010).

A = pulmonary circulation
B = systemic circulation
C = portal circulation
D = lymphatic circulation

The center of the circulatory system is the heart, which is situated in the thoracic cavity and in contact with the diaphragm. In the right ventricle, the venous blood is collected and pumped through the pulmonary artery and into the lung where the blood is oxygenated. The veins of the lung transport the blood to the left ventricle, where it is pumped through the aorta and its branches (arteries) in the human body. Arteries and veins mostly run parallel. The venous blood from the intestine reaches the liver via the portal vein.



Organization of the lymphatic system.
Course of the main lymphatic vessels and lymph nodes in the body. Dotted red line = border between lymphatic vessels draining toward the right and the left venous angles.



Major lymph vessels of the trunk (green). Blue = veins, red = arteries, white = nerves.

1 Right venous angle
2 Axillary lymph nodes
3 Left venous angle
4 Thoracic duct
5 Aorta
6 Inguinal lymph nodes
7 Cisterna chyli
8 Left kidney

Lymphatic vessels originate in the tissue spaces (lymph capillaries) and unite to form larger vessels (lymphatics). These resemble veins but have a much thinner wall, more valves, and are interrupted by lymph nodes at various intervals. Large groups of lymph nodes are located in the inguinal and axillary regions, deep to the mandible and sternocleidomastoid muscle, and within the root of the mesentery of the intestine. The lymphatic vessels of the right half of the head and neck, the right thorax, and the right upper limb drain toward the right venous angle; those of the rest of the body, toward the left venous angle.

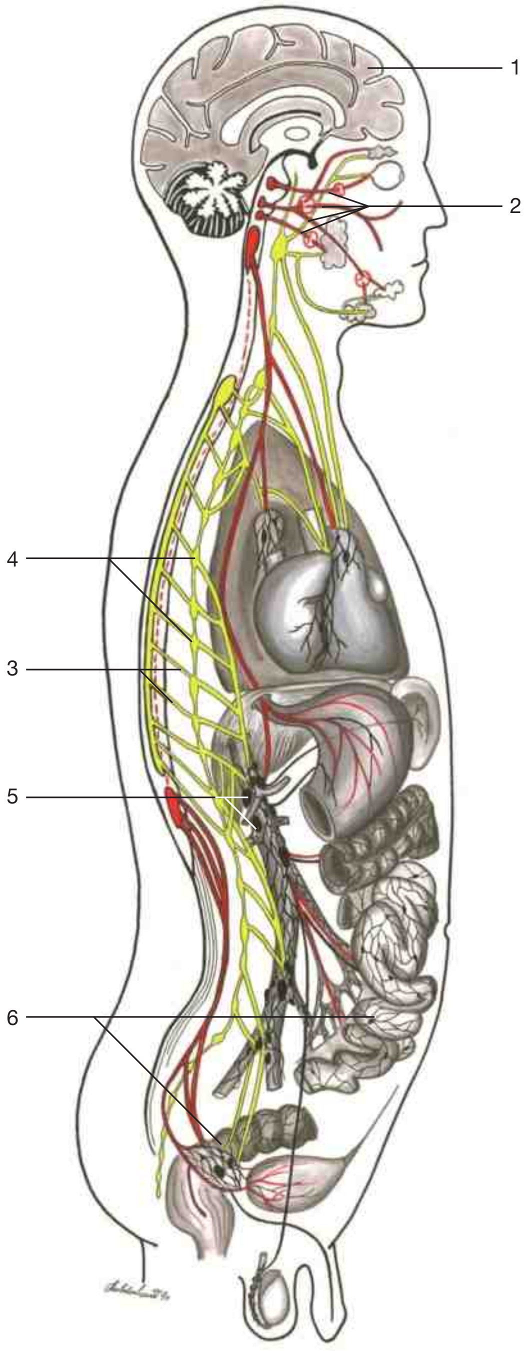
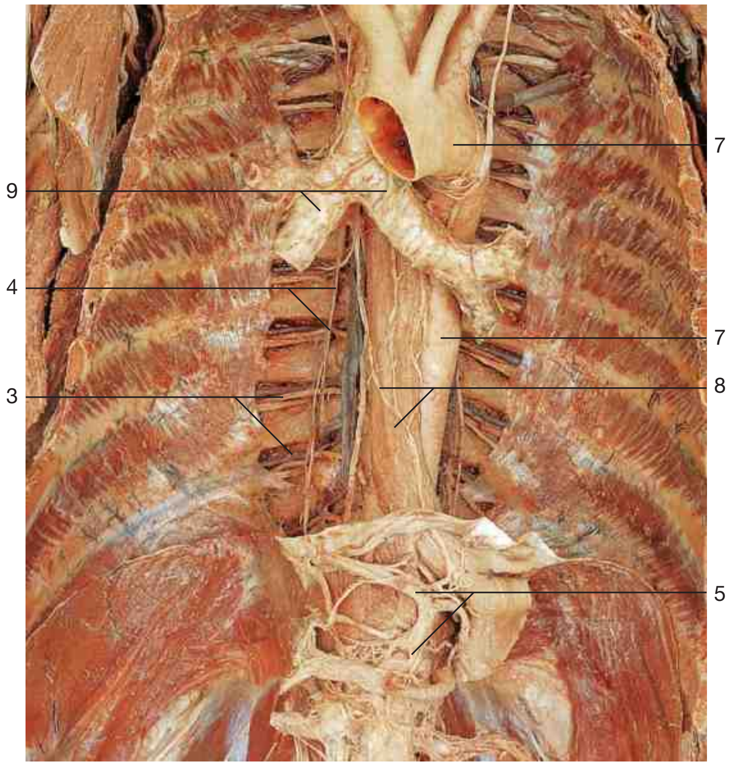


Diagram illustrating the **localization of the three functional portions of the nervous system** (brain, spinal cord and autonomic nervous system). Yellow = sympathetic system; red = parasympathetic system.



Posterior part of the trunk. The **solar plexus** with its connection to the vagus nerve and the sympathetic trunk has been dissected.

1 Cerebrum
2 Cranial nerves
3 Spinal nerves
4 Sympathetic trunk
5 Solar plexus
6 Nervous plexus of the autonomic system
7 Aorta
8 Vagus nerve and esophagus
9 Bifurcation of trachea

The nervous system can be divided into three functionally distinct parts:

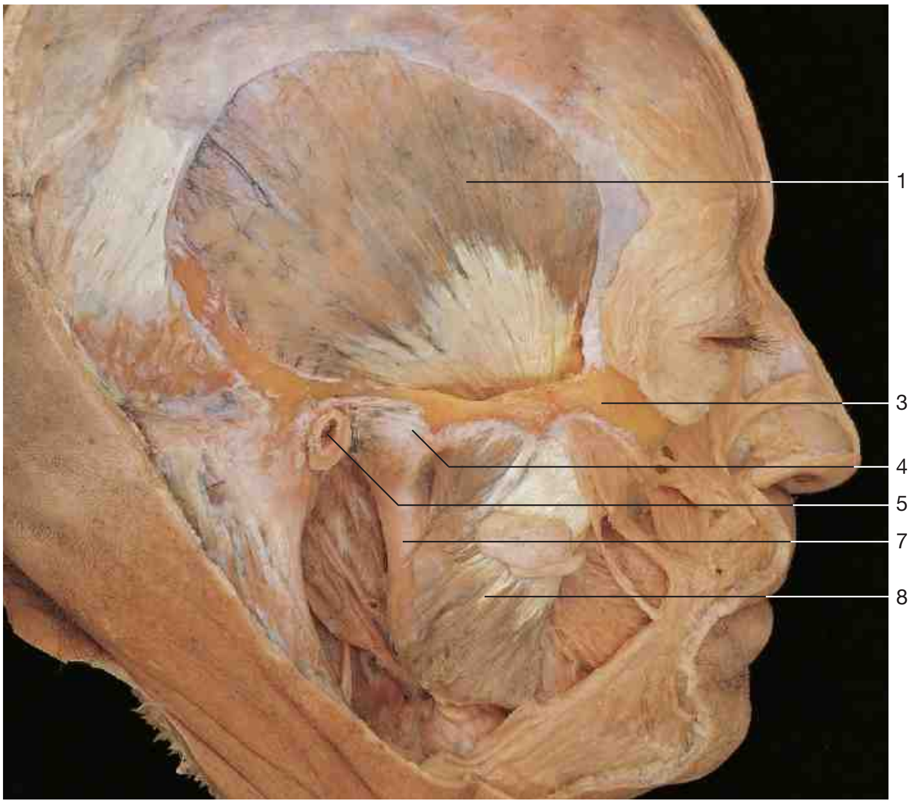
1. The cranial part, which comprises the great sensory organs and the brain.
2. The spinal cord, which shows a segmental structure and serves predominantly as a reflex organ.
3. The autonomic nervous system, which controls the involuntary functions (subconscious control) of organs and tissues. The autonomic part of the nervous system forms many delicate plexuses near or within the organs. At certain places these plexuses contain aggregations of nerve cells (prevertebral and intramural ganglia).

The spinal nerves leave the spinal cord at regular intervals. The ventral rami of the spinal nerves form the cervical and brachial plexus, which innervates the upper extremity, and the ventral rami of the lumbar and sacral spinal nerves form the lumbosacral plexus, which innervates the pelvis and genital organs and the lower extremity.

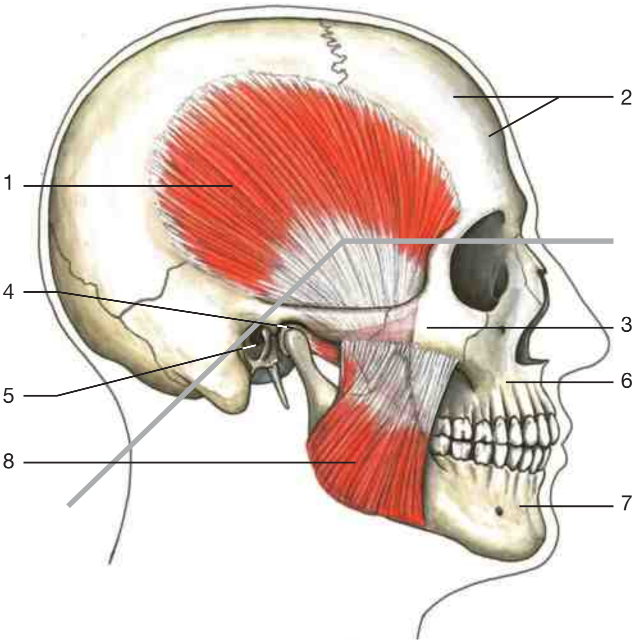
2 Head and Neck

2.1 Skull and Muscles of the Head

The head contains the brain and the great sensory organs (neurocranium). Anteriorly, the facial bones, the facial muscles, and the muscles of mastication have been developed (viscerocranium). The base of the skull is slightly bent so that the structures of the viscerocranium become located underneath the neurocranium, a specifity of the human head. Therefore mimic movements are possible in the human face.

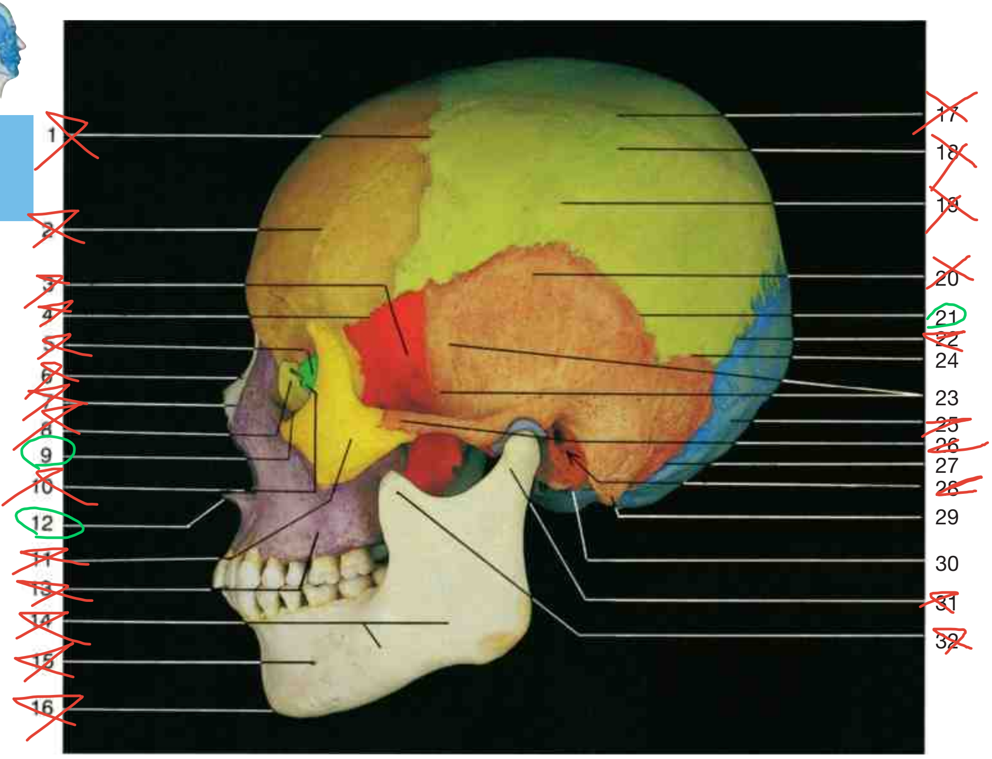


Muscles of mastication and facial muscles (lateral aspect).
The auricle has been removed.



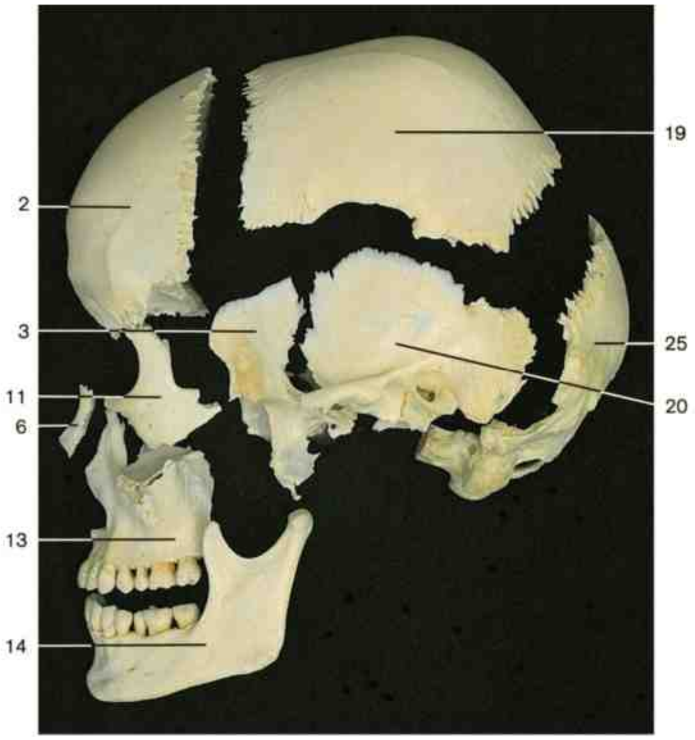
1 Temporalis muscle
2 Frontal bone
3 Zygomatic bone
4 Temporomandibular joint
5 External acoustic meatus
6 Maxilla
7 Mandible
8 Masseter muscle

Lateral aspect of the skull with muscles of mastication (temporalis and masseter muscles = red).
The base of the skull is bent (grey line).



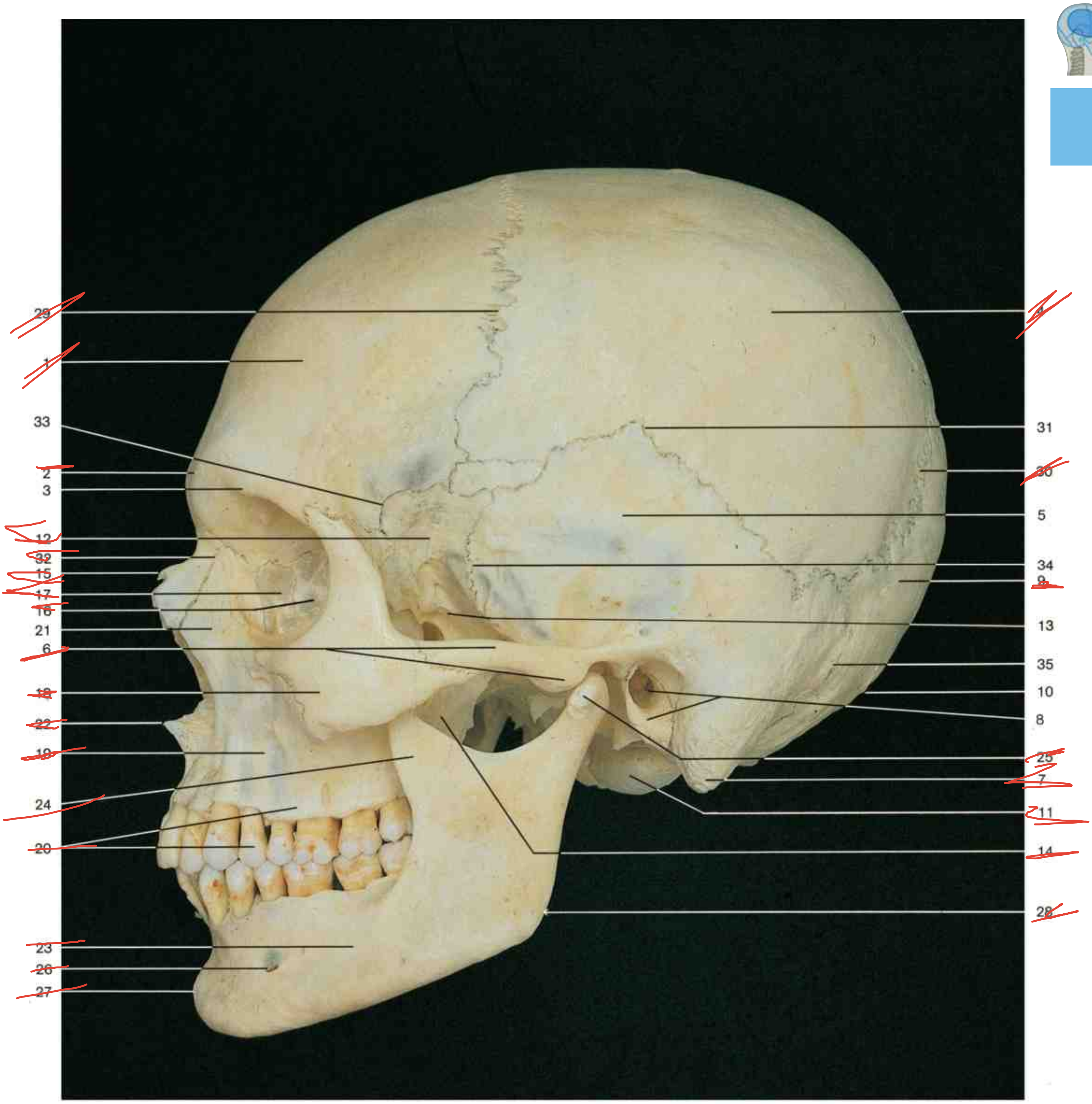
General architecture of the skull (lateral aspect). The different bones are indicated in color (numbers cf. table).

1	Coronal suture
2	Frontal bone
3	Sphenoidal bone
4	Sphenofrontal suture
5	Ethmoidal bone
6	Nasal bone
7	Nasomaxillary suture
8	Lacrimal bone
9	Lacrimomaxillary suture
10	Ethmoidolacrimal suture
11	Zygomatic bone
12	Anterior nasal spine
13	Maxilla
14	Mandible
15	Mental foramen
16	Mental protuberance
17	Superior temporal line
18	Inferior temporal line
19	Parietal bone
20	Temporal bone
21	Squamous suture
22	Lambdoid suture
23	Temporal fossa
24	Parietomastoid suture
25	Occipital bone
26	Zygomatic arch
27	Occipitomastoid suture
28	External acoustic meatus
29	Mastoid process
30	~~Tympanic portion of temporal bone~~
31	Condylar process of mandible
32	Coronoid process of mandible



Lateral aspect of the disarticulated skull (palatine bone, lacrimal bone, ethmoidal bone, and vomer are not depicted).

2	Frontal bone (orange)	**Cranial bones**
19	Parietal bone (light yellow)	
3	Greater wing of sphenoidal bone (red)	
25	Squama of occipital bone (blue)	
20	Squama of temporal bone (brown)	
5	Ethmoidal bone (dark green)	**Base of skull**
3	Sphenoidal bone (red)	
	Temporal bone excluding squama (brown)	
30	Tympanic portion of temporal bone (dark brown)	
	Occipital bone excluding squama (blue)	
6	Nasal bone (white)	**Facial bones**
8	Lacrimal bone (light yellow)	
	Inferior nasal concha	
	Vomer	
11	Zygomatic bone (dark yellow)	
	Palatine bone	
13	Maxilla (violet)	
14	Mandible (white)	
	Malleus Incus Stapes } within petrous portion of temporal bone	**Auditory ossicles**
	Hyoid	

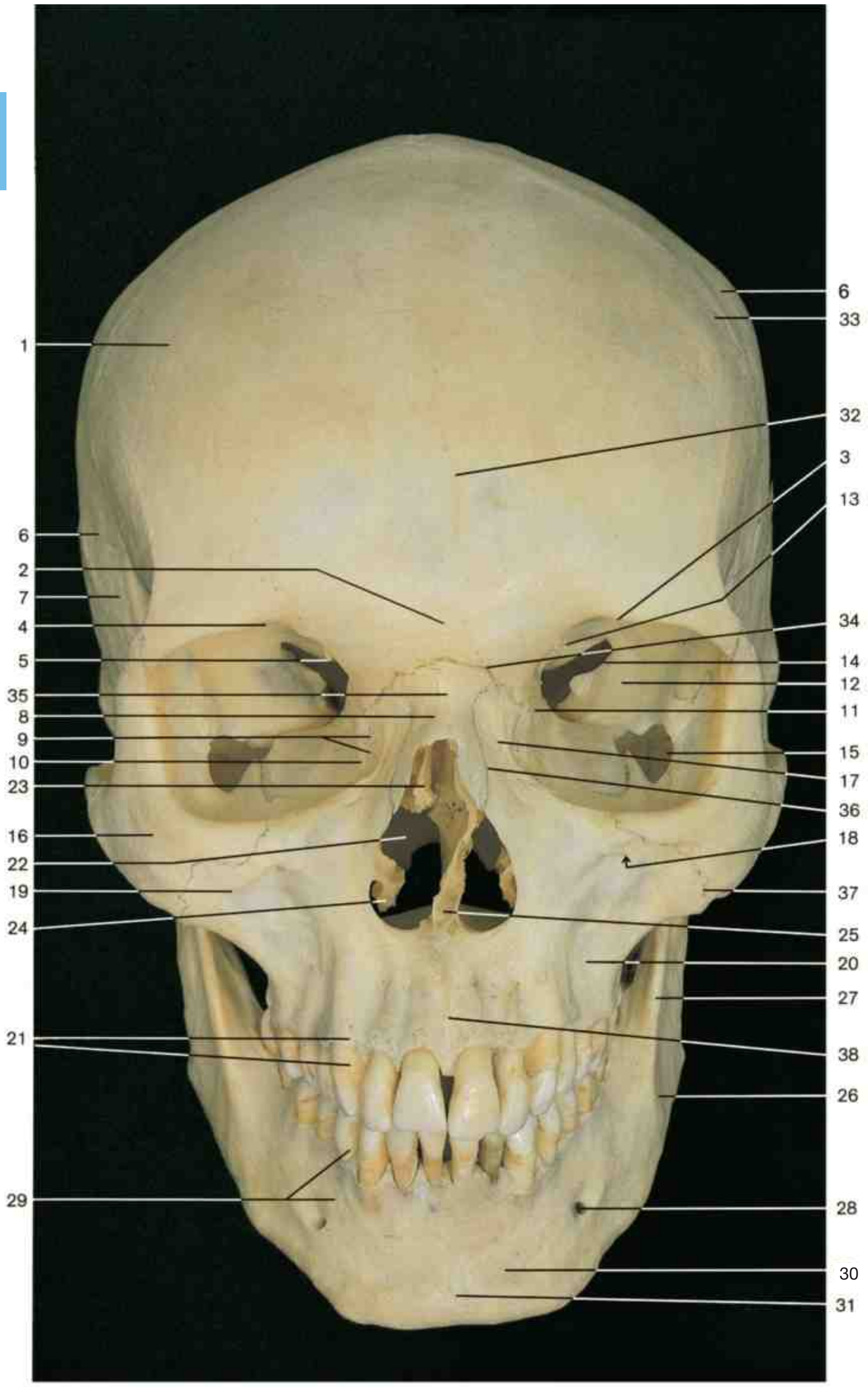


Lateral aspect of the skull.

1 Frontal bone
2 Glabella
3 Supraorbital margin
4 Parietal bone
5 Temporal bone (squamous part)
6 Zygomatic process (articular tubercle)
7 Mastoid process
8 Tympanic part (tympanic plate) and external acoustic meatus
9 Occipital bone (squamous part)
10 External occipital protuberance
11 Occipital condyle
12 Sphenoidal bone (greater wing)
13 Infratemporal crest of sphenoid
14 Pterygoid process (lateral pterygoid plate)
15 Nasal bone
16 Ethmoidal bone (orbital part)
17 Lacrimal bone
18 Zygomatic bone
19 Maxilla (body)
20 Alveolar process and teeth
21 Frontal process
22 Anterior nasal spine
23 Mandible (body)
24 Coronoid process
25 Condylar process
26 Mental foramen
27 Mental protuberance
28 Angle of the mandible

Sutures

29 Coronal suture
~~30~~ Lambdoid suture
31 Squamous suture
32 Nasomaxillary suture
33 Frontosphenoid suture
34 Sphenosquamosal suture
35 Occipitomastoid suture



Anterior aspect of the skull.

1 Frontal bone
2 Glabella
3 Supra-orbital margin
4 Supra-orbital notch
5 Trochlear spine
6 Parietal bone
7 Temporal bone
8 Nasal bone

Orbit
9 Lacrimal bone
10 Posterior lacrimal crest
11 Ethmoidal bone

Sphenoidal bone
12 Greater wing of sphenoidal bone
13 Lesser wing of sphenoidal bone
14 Superior orbital fissure
15 Inferior orbital fissure
16 Zygomatic bone

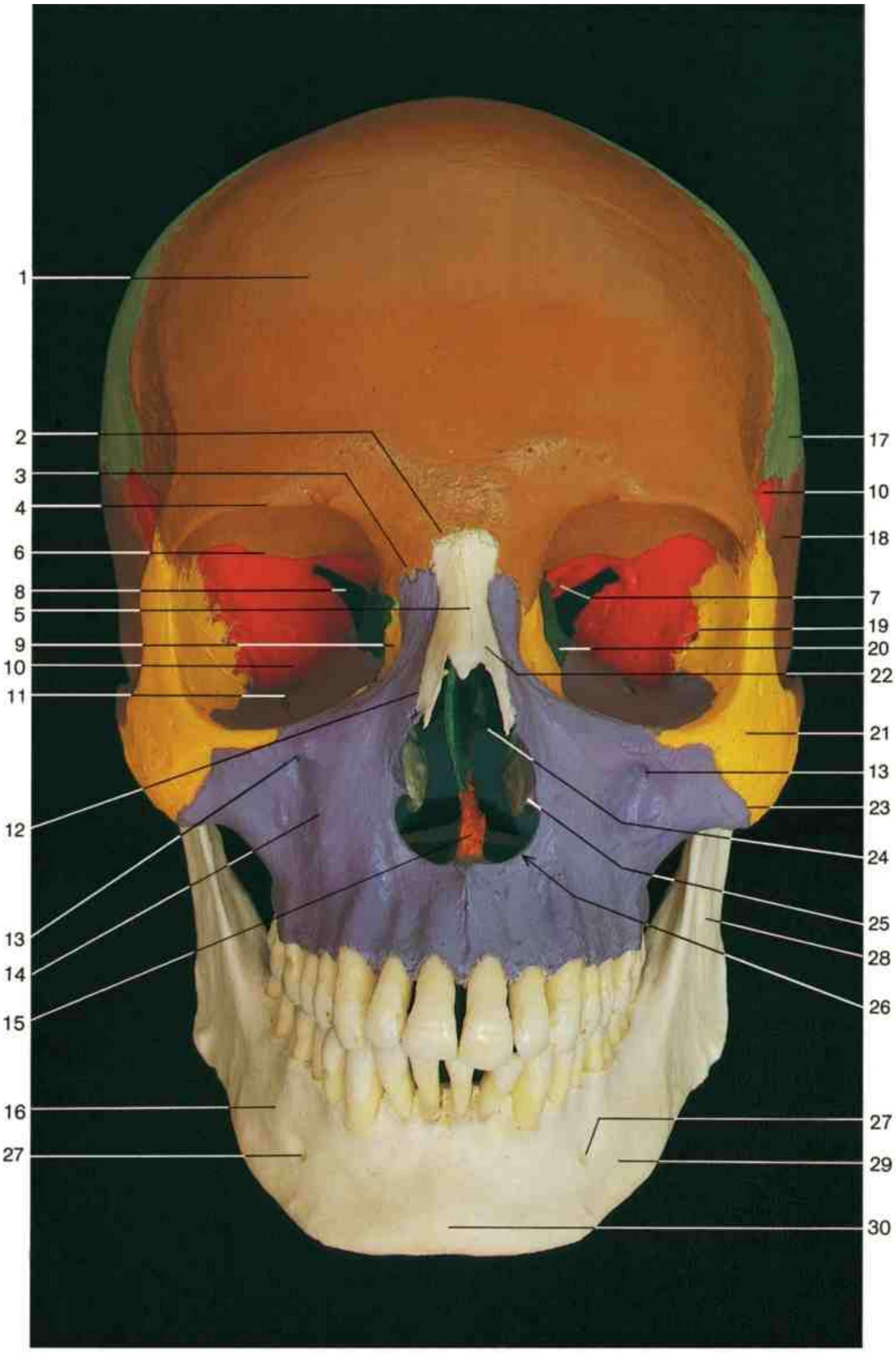
Maxilla
17 Frontal process
18 Infra-orbital foramen
19 Zygomatic process
20 Body of maxilla
21 Alveolar process with teeth

Nasal cavity
22 Anterior nasal aperture
23 Middle nasal concha
24 Inferior nasal concha
25 Nasal septum, vomer

Mandible
26 Body of mandible
27 Ramus of mandible
28 Mental foramen
29 Alveolar part with teeth
30 Base of mandible
31 Mental protuberance

Sutures
32 Frontal suture
33 Coronal suture
34 Frontonasal suture
35 Internasal suture
36 Nasomaxillary suture
37 Zygomaticomaxillary suture
38 Intermaxillary suture

The skull comprises a mosaic of numerous complicated bones that form the cranial cavity protecting the brain **(neurocranium)** and several cavities such as the nasal and oral cavities in the facial region. The neurocranium consists of large bony plates that develop directly from the surrounding sheets of connective tissue **(desmocranium).** The bones of the skull base are formed out of cartilaginous tissue **(chondrocranium),** which ossifies secondarily. The **visceral skeleton,** which in fish gives rise to the gills, has in higher vertebrates been transformed into the bones of the masticatory and auditory apparatus (maxilla, mandible, auditory ossicles, and hyoid bone).

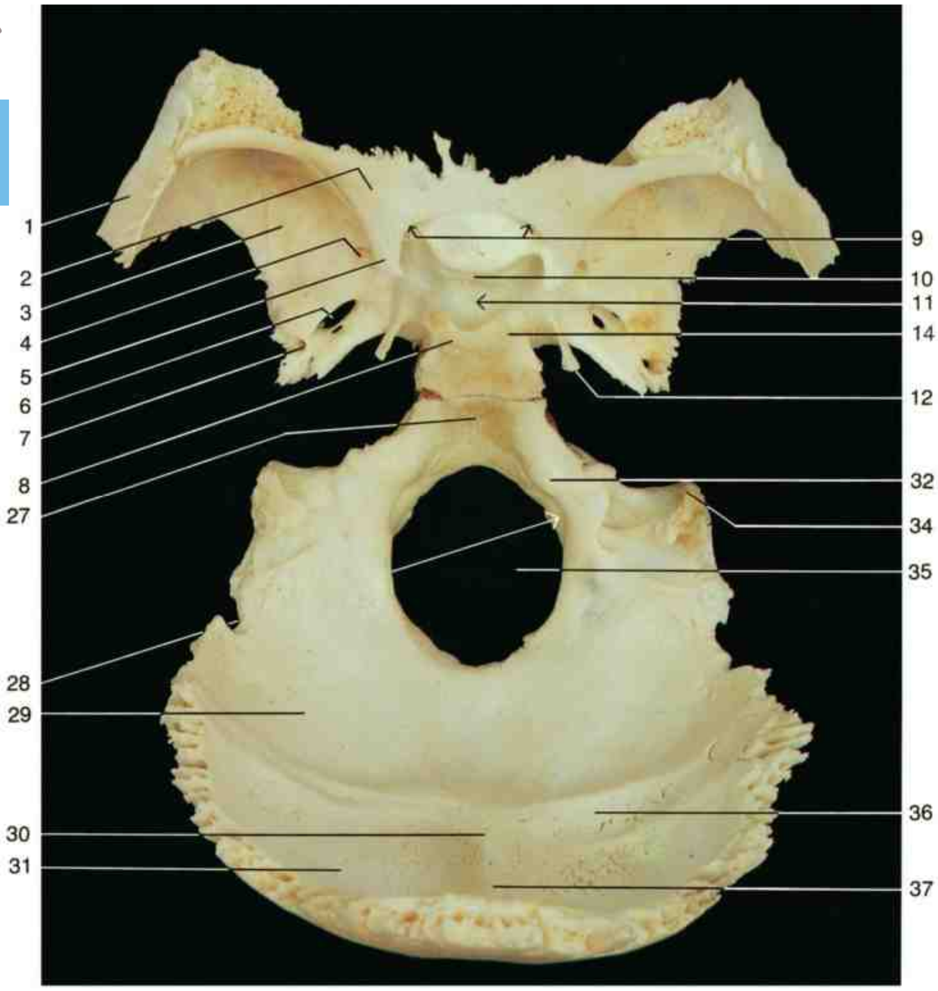


Anterior aspect of the skull (individual bones indicated by color).

1 Frontal bone
2 Frontonasal suture
3 Frontomaxillary suture
4 Supra-orbital margin
5 Internasal suture
6 Sphenofrontal suture
7 Optic canal in lesser wing of sphenoidal bone
8 Superior orbital fissure
9 Lacrimal bone
10 Sphenoidal bone (greater wing)
11 Inferior orbital fissure
12 Nasomaxillary suture
13 Infra-orbital foramen
14 Maxilla
15 Vomer
16 Body of mandible
17 Parietal bone
18 Temporal bone
19 Sphenozygomatic suture
20 Ethmoidal bone
21 Zygomatic bone
22 Nasal bone
23 Zygomaticomaxillary suture
24 Middle nasal concha
25 Inferior nasal concha
26 Anterior nasal aperture
27 Mental foramen
28 Ramus of mandible
29 Base of mandible
30 Mental protuberance

Bones
Brown = frontal bone
Light green = parietal bone
Dark brown = temporal bone
Red = sphenoidal bone
Yellow = zygomatic bone
Dark green = ethmoidal bone
Yellow = lacrimal bone
Orange = vomer
Violet = maxilla
White = nasal bone
White = mandible

The following series of figures are arranged so that the mosaic-like pattern of the skull becomes understandable. It starts with the bones of the **skull base** (sphenoidal and occipital bones) to which the other bones are added step by step. The facial skeleton is built up by the ethmoidal bone to which the palatine bone and maxilla are attached laterally; the small nasal and lacrimal bones fill the remaining spaces. Cartilages remain only in the external part of the nose.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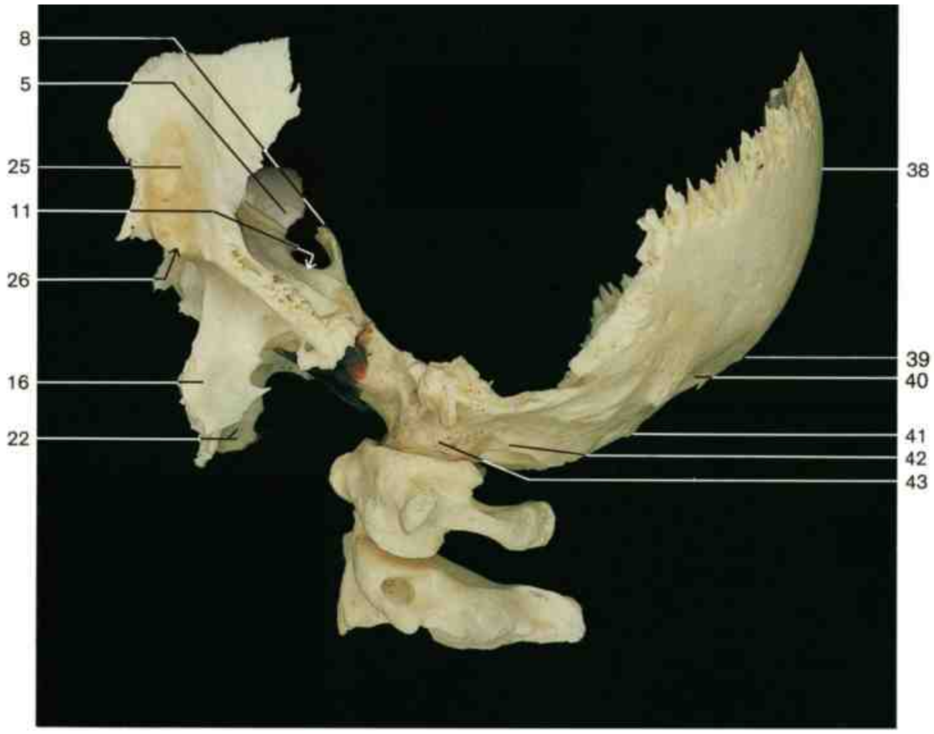
Sphenoidal and occipital bone (from above).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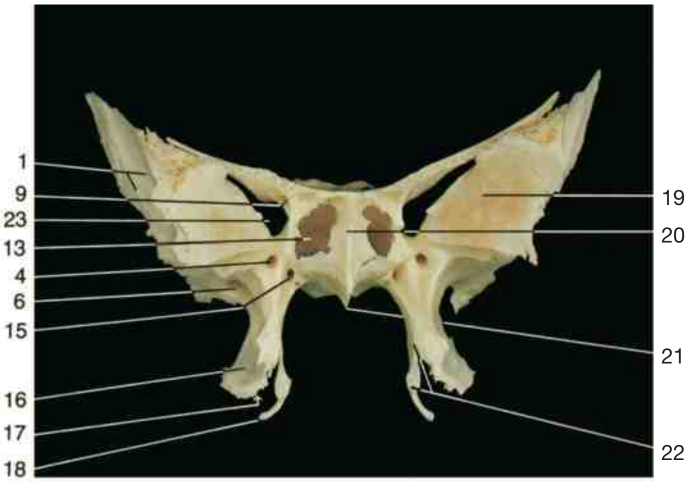
Sphenoidal and occipital bone in connection with the atlas and axis (1st and 2nd cervical vertebrae) (left lateral view).

Sphenoidal bone

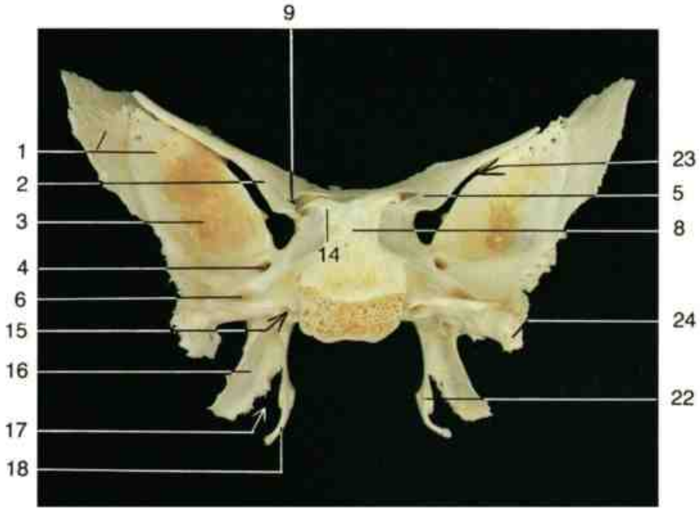
1 Greater wing
2 Lesser wing
3 Cerebral or superior surface of greater wing
4 Foramen rotundum
5 Anterior clinoid process
6 Foramen ovale
7 Foramen spinosum
8 Dorsum sellae
9 Optic canal
10 Chiasmatic groove (sulcus chiasmatis)
11 Hypophysial fossa (sella turcica)
12 Lingula
13 Opening of sphenoidal sinus
14 Posterior clinoid process
15 Pterygoid canal
16 Lateral pterygoid plate of pterygoid process
17 Pterygoid notch
18 Pterygoid hamulus
19 Orbital surface of greater wing
20 Sphenoidal crest
21 Sphenoidal rostrum
22 Medial pterygoid plate
23 Superior orbital fissure
24 Spine of sphenoid
25 Temporal surface of greater wing
26 Infratemporal crest

Occipital bone

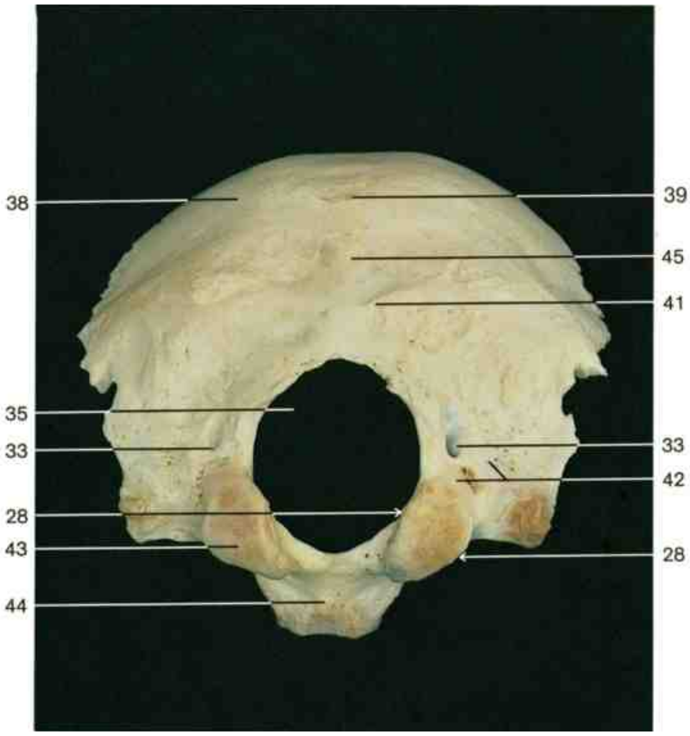
27 Clivus with basilar part of occipital bone
28 Hypoglossal canal
29 Fossa for cerebellar hemisphere
30 Internal occipital protuberance
31 Fossa for cerebral hemisphere
32 Jugular tubercle
33 Condylar canal
34 Jugular process
35 Foramen magnum
36 Groove for transverse sinus
37 Groove for superior sagittal sinus
38 Squamous part of the occipital bone
39 External occipital protuberance
40 Superior nuchal line
41 Inferior nuchal line
42 Condylar fossa
43 Condyle
44 Pharyngeal tubercle
45 External occipital crest



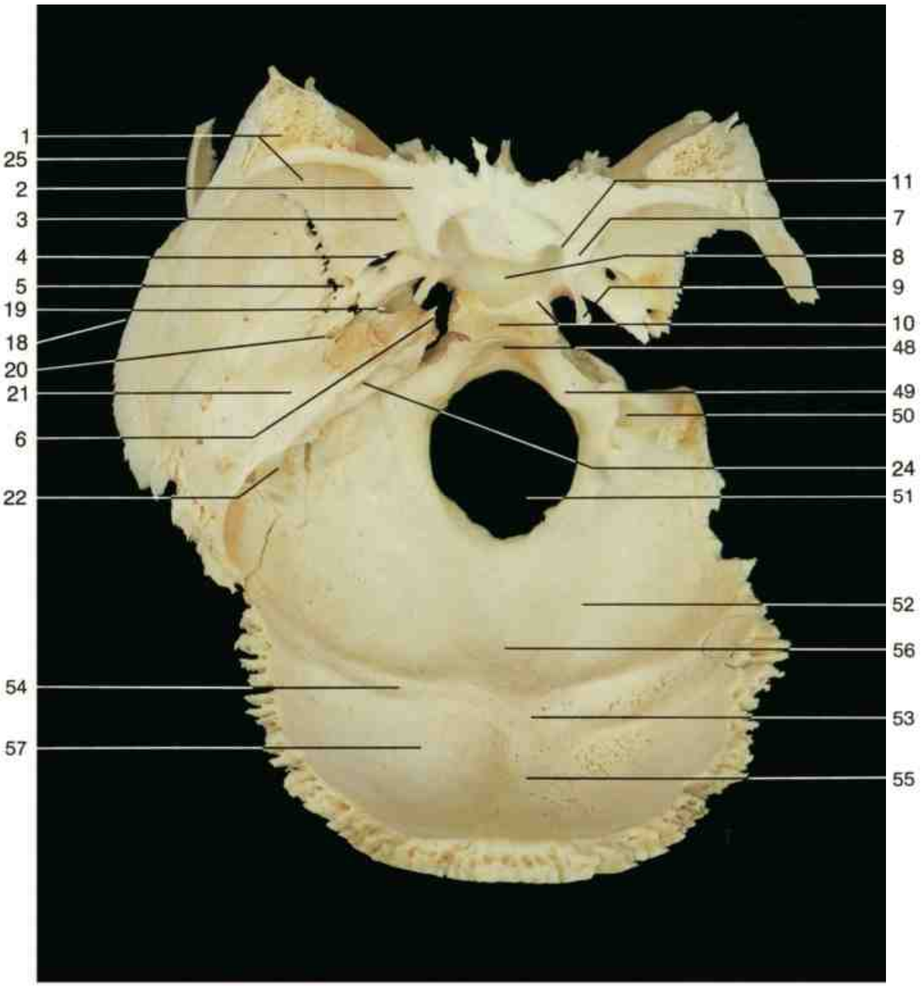
Sphenoidal bone (anterior aspect).



Sphenoidal bone (posterior aspect).



Occipital bone (from below).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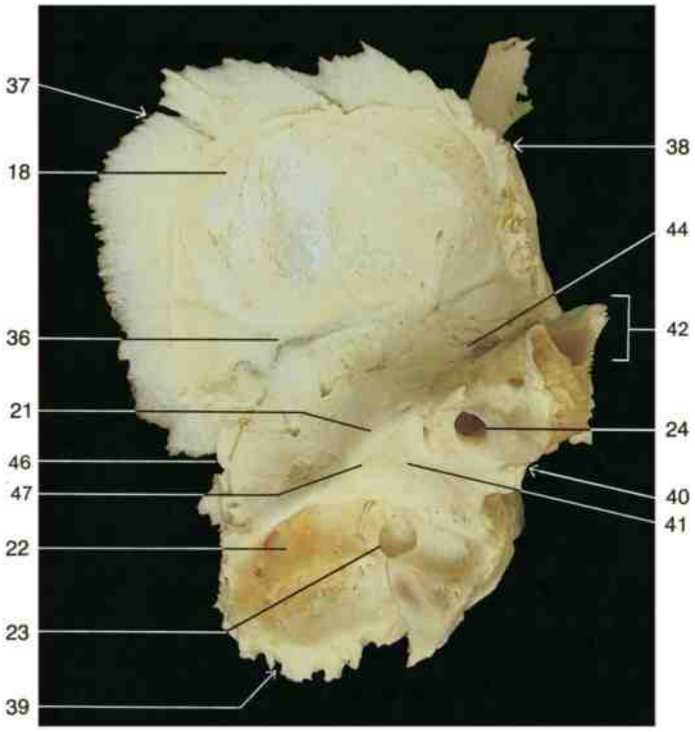
Sphenoidal, occipital, and left temporal bone (from above). Internal aspect of the base of the skull. The left temporal bone has been added to the preceding figure.

Sphenoidal bone

1 Greater wing
2 Lesser wing
3 Foramen rotundum
4 Foramen ovale
5 Foramen spinosum
6 Foramen lacerum
7 Anterior clinoid process
8 Hypophysial fossa (sella turcica)
9 Lingula
10 Dorsum sellae and posterior clinoid process
11 Optic canal
12 Sphenoidal rostrum
13 Medial pterygoid plate
14 Lateral pterygoid plate
15 Pterygoid hamulus
16 Infratemporal crest
17 Body of the sphenoidal bone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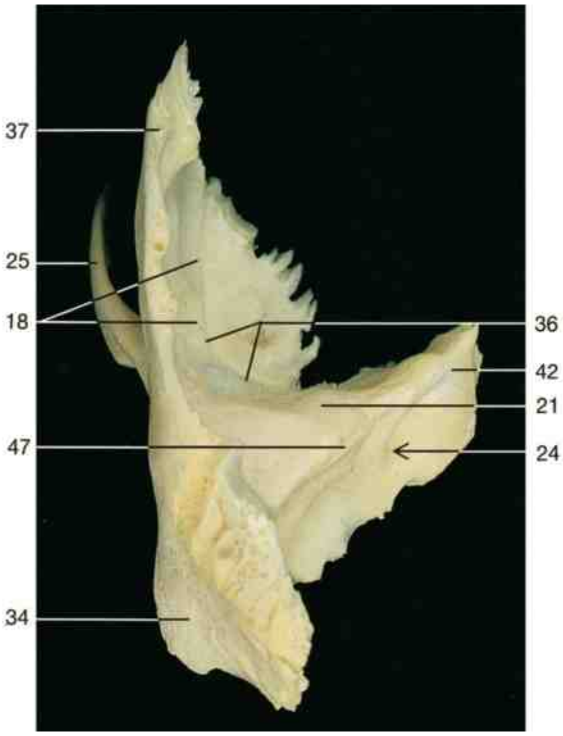
Left temporal bone (medial aspect).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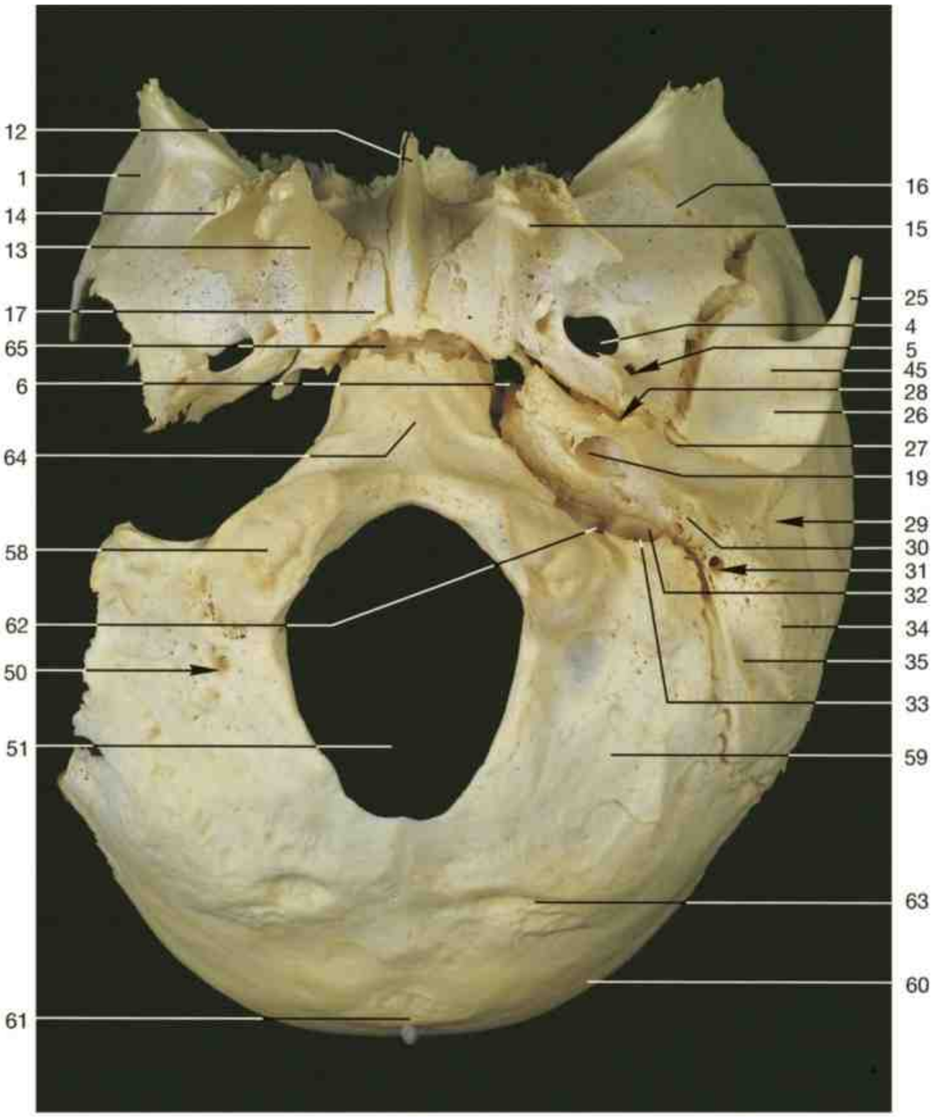
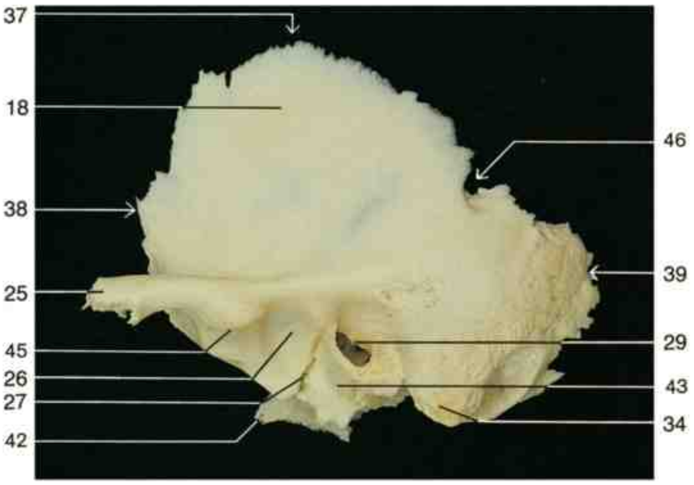
Left temporal bone (from above).



Sphenoidal, occipital, and left temporal bone. Base of the skull (external aspect).



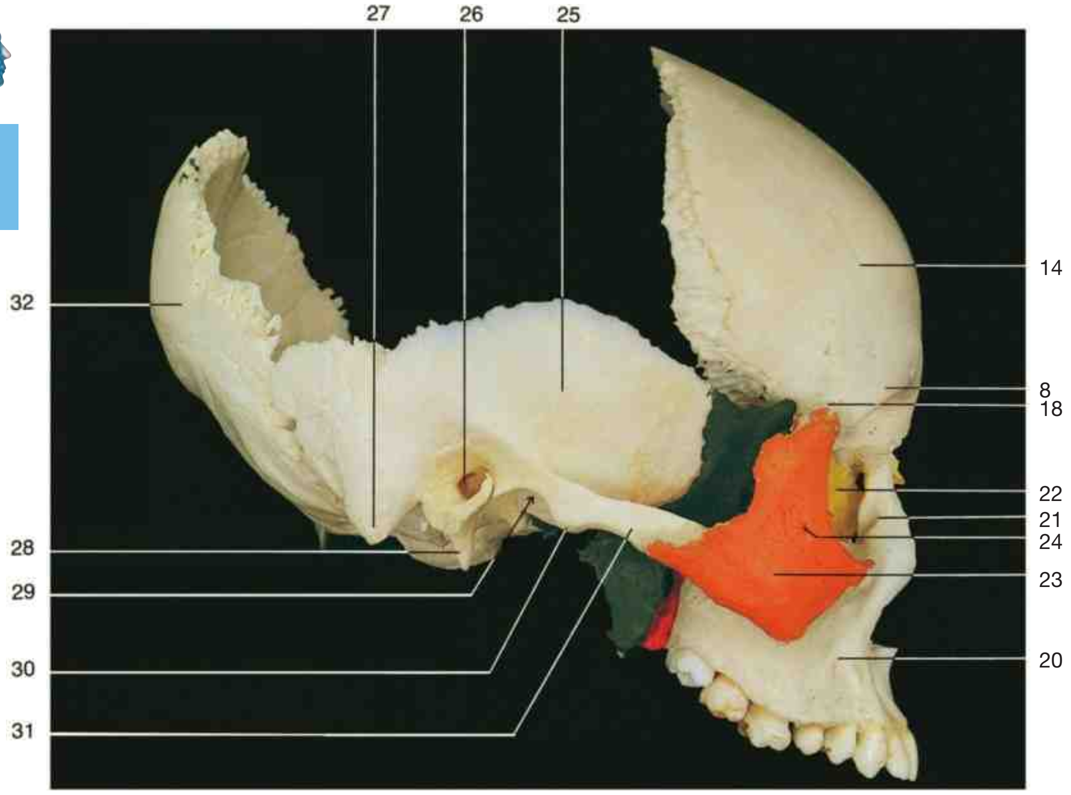
Left temporal bone (lateral aspect).

Temporal bone

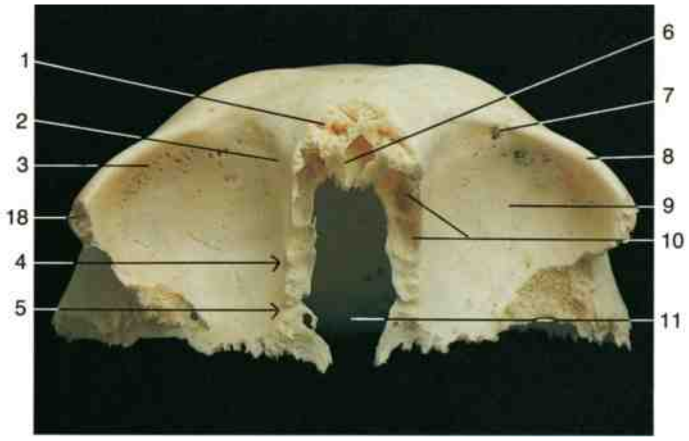
18	Squamous part
19	Carotid canal
20	Hiatus of facial canal (for the greater petrosal nerve)
21	Arcuate eminence
22	Groove for the sigmoid sinus
23	Mastoid foramen
24	Internal acoustic meatus
25	Zygomatic process
26	Mandibular fossa
27	Petrotympanic fissure
28	Canalis musculotubarius (bony part of auditory tube)
29	External acoustic meatus
30	Styloid process (remnant only)
31	Stylomastoid foramen
32	Mastoid canaliculus
33	Jugular fossa
34	Mastoid process
35	Mastoid notch
36	Groove for middle meningeal vessels
37	Parietal margin
38	Sphenoidal margin
39	Occipital margin
40	Cochlear canaliculus
41	Aqueduct of the vestibule
42	Apex of the petrous part
43	Tympanic part
44	Trigeminal impression
45	Articular tubercle
46	Parietal notch
47	Groove for the superior petrosal sinus

Occipital bone

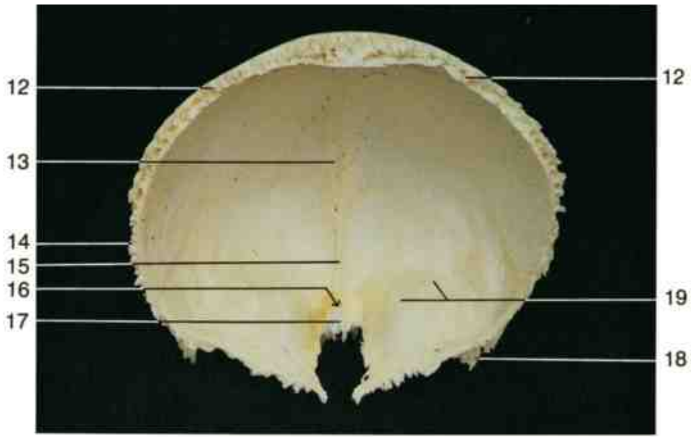
48	Clivus
49	Jugular tubercle
50	Condylar canal
51	Foramen magnum
52	Lower part of squamous occipital bone (cerebellar fossa)
53	Internal occipital protuberance
54	Groove for the transverse sinus
55	Groove for the superior sagittal sinus
56	Internal occipital crest
57	Upper part of squamous occipital bone (cerebral fossa)
58	Condyle
59	Nuchal plane
60	Superior nuchal line
61	External occipital protuberance
62	Jugular foramen
63	Inferior nuchal line
64	Pharyngeal tubercle
65	Spheno-occipital synchondrosis



Part of a disarticulated skull (right lateral aspect). The frontal bone and the maxilla are connected with the temporal bone by the zygomatic bone (orange). Sphenoidal bone (black), palatine bone (red), lacrimal bone (yellow).



Frontal bone (inferior aspect). The ethmoidal foveolae cover the ethmoidal cavities of the ethmoidal bone.



Frontal bone (posterior aspect).

Frontal bone

1	Nasal margin
2	Trochlear fossa
3	Fossa for lacrimal gland
4	Anterior ethmoidal foramen
5	Posterior ethmoidal foramen
6	Nasal spine
7	Supra-orbital notch
8	Supra-orbital margin
9	Orbital plate
10	Roofs of the ethmoidal air cells
11	Ethmoidal notch
12	Parietal margin
13	Groove for superior sagittal sinus
14	Squamous part of frontal bone
15	Frontal crest
16	Foramen cecum
17	Nasal spine
18	Zygomatic process of frontal bone
19	Juga cerebralia

Facial bones

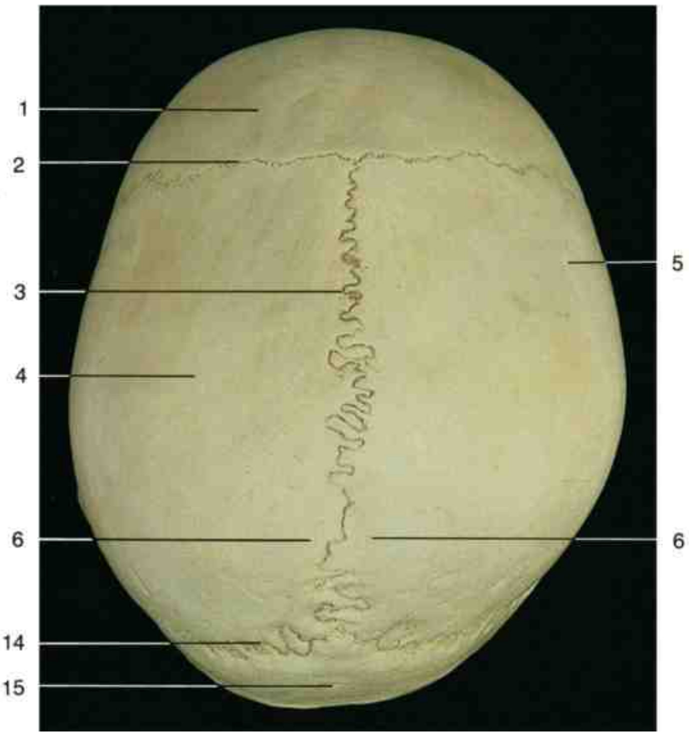
20	Maxilla
21	Frontal process of maxilla
22	Lacrimal bone (yellow)
23	Zygomatic bone (orange)
24	Zygomaticofacial foramen

Temporal bone

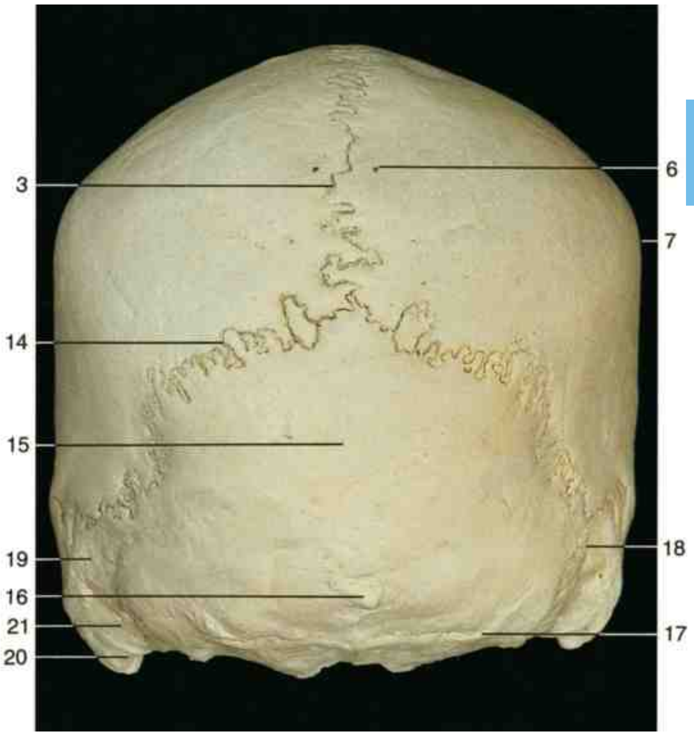
25	Squamous part of temporal bone
26	External acoustic meatus
27	Mastoid process
28	Styloid process
29	Mandibular fossa
30	Articular tubercle
31	Zygomatic process

Occipital bone

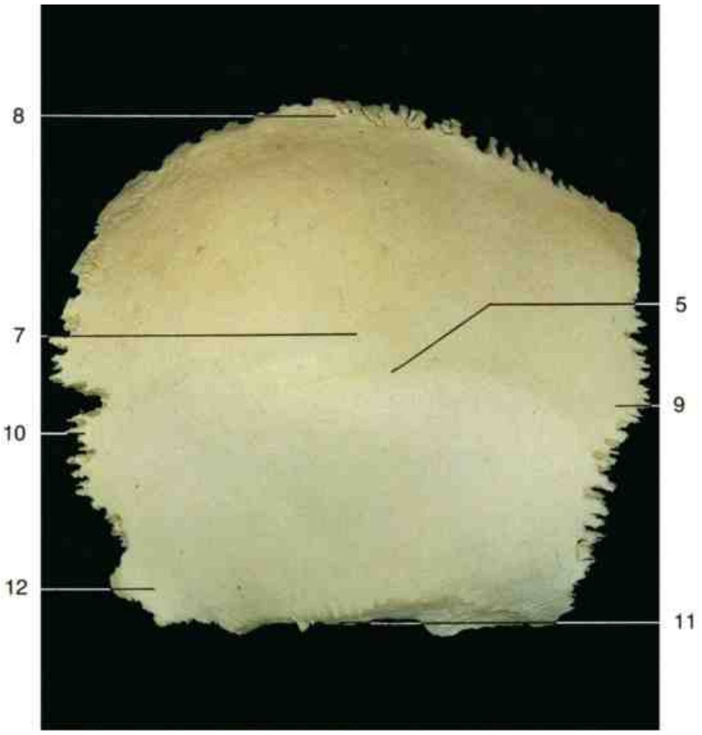
32	Squamous part of occipital bone



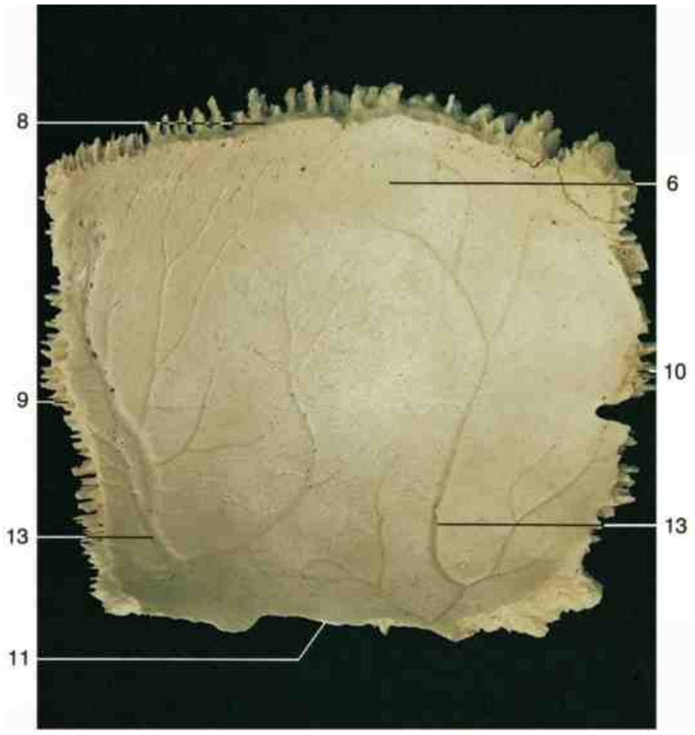
Calvaria (superior aspect).



Calvaria (posterior aspect).

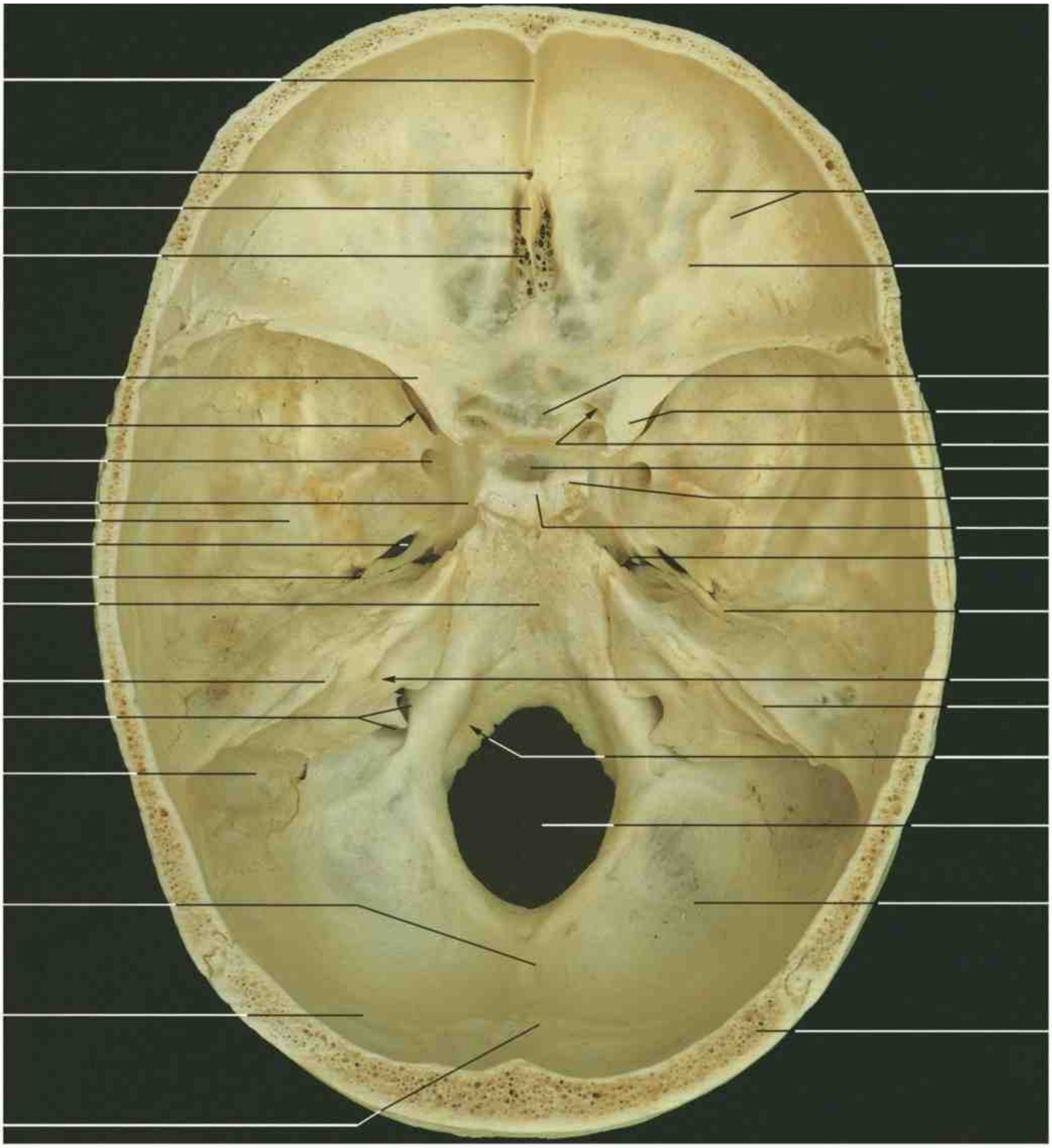


Left parietal bone (external aspect).



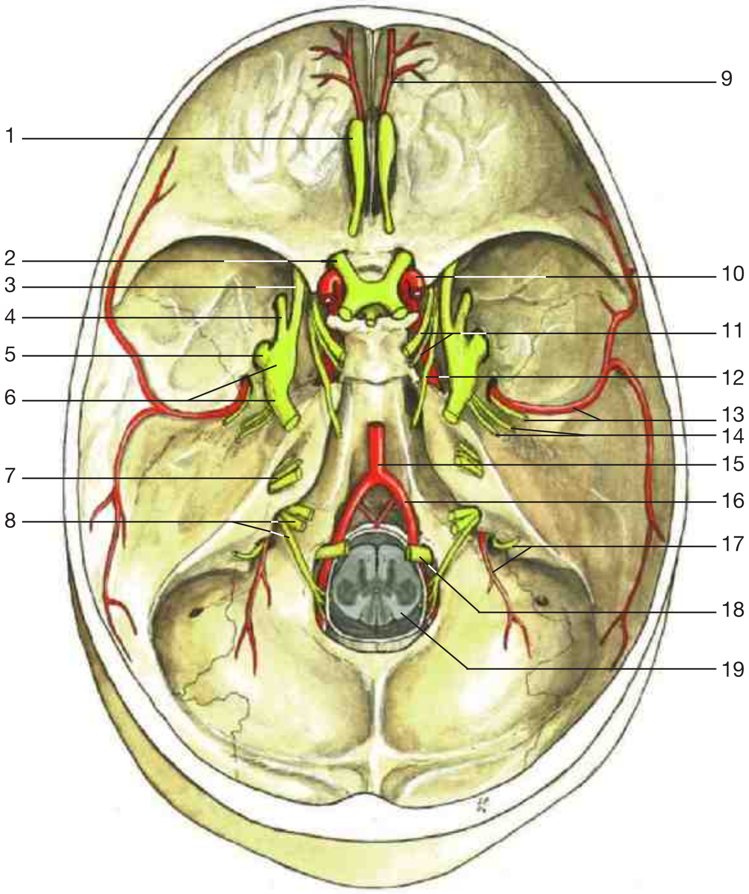
Left parietal bone (internal aspect).

1 Frontal bone
2 Coronal suture
3 Sagittal suture
4 Parietal bone
5 Superior temporal line
6 Parietal foramen
7 Parietal tuber or eminence
8 Sagittal margin
9 Occipital margin
10 Frontal margin
11 Squamous margin
12 Sphenoidal angle
13 Groove for middle meningeal artery
14 Lambdoid suture
15 Occipital bone
16 External occipital protuberance
17 Inferior nuchal line
18 Occipitomastoid suture
19 Temporal bone
20 Mastoid process
21 Mastoid notch



Base of the skull, calvaria removed (internal aspect).

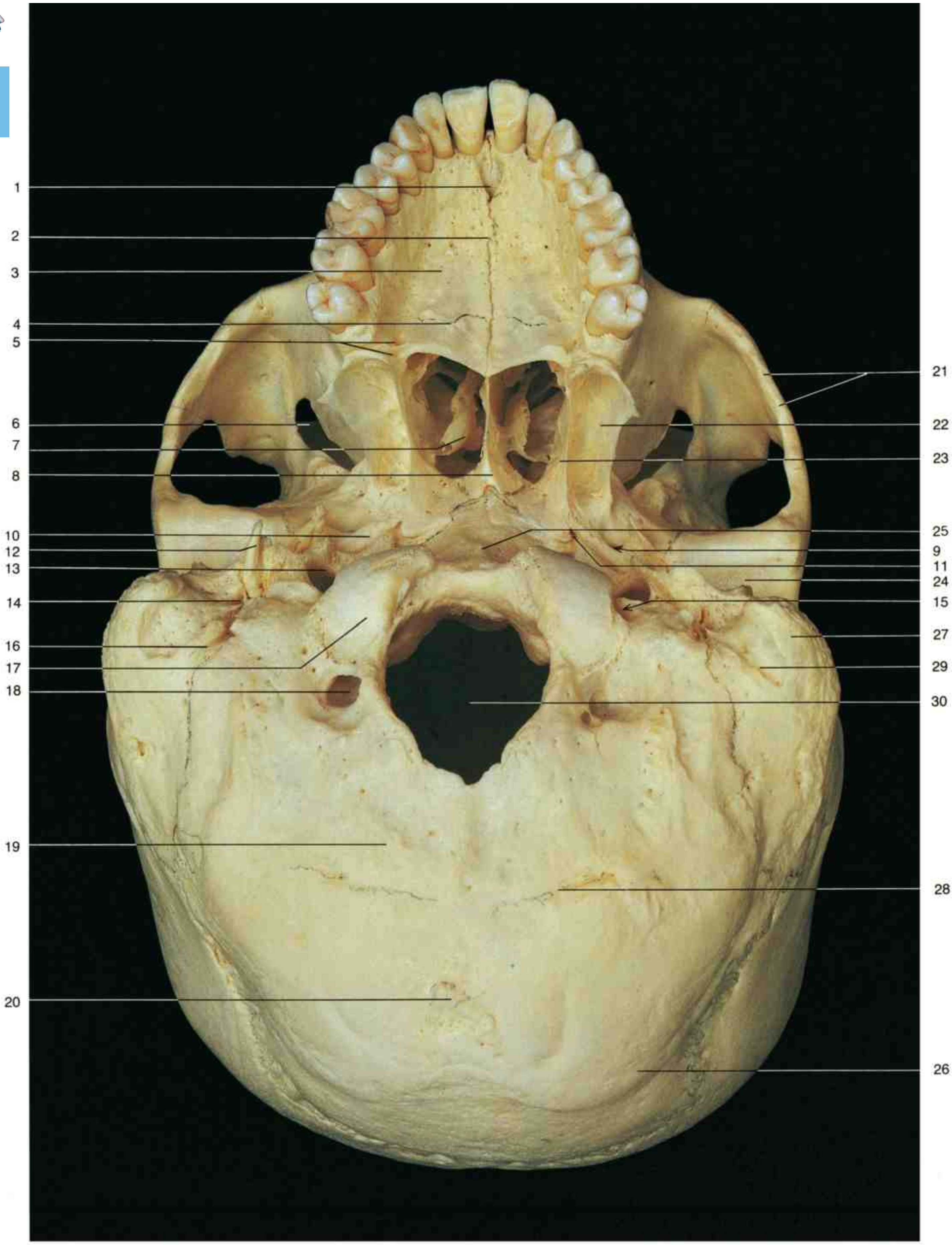
1	Frontal crest	12	Clivus	23	Optic canal
2	Foramen cecum	13	Groove for superior petrosal sinus	24	Sella turcica (hypophysial fossa)
3	Crista galli	14	Jugular foramen	25	Posterior clinoid process
4	Cribriform plate of ethmoidal bone	15	Groove for sigmoid sinus	26	Dorsum sellae
5	Lesser wing of sphenoidal bone	16	Internal occipital crest	27	Foramen lacerum
6	Superior orbital fissure	17	Groove for transverse sinus	28	Groove for greater petrosal nerve
7	Foramen rotundum	18	Internal occipital protuberance	29	Internal acoustic meatus
8	Carotid sulcus	19	Digitate impressions	30	Hypoglossal canal
9	Middle cranial fossa	20	Anterior cranial fossa	31	Foramen magnum
10	Foramen ovale	21	Chiasmatic sulcus	32	Posterior cranial fossa
11	Foramen spinosum	22	Anterior clinoid process	33	Diploe



1 Olfactory bulb
2 Optic nerve (n. II)
3 Ophthalmic nerve (n. V_1)
4 Maxillary nerve (n. V_2)
5 Mandibular nerve (n. V_3)
6 Trigeminal nerve (n. V) with trigeminal ganglion
7 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
8 Glossopharyngeal nerve (n. IX), vagus nerve (n. X) and accessory nerve (n. XI)
9 Anterior meningeal artery
10 Internal carotid artery
11 Oculomotor nerve (n. III) and trochlear nerve (n. IV)
12 Abducent nerve (n. VI)
13 Middle meningeal artery and meningeal branch of mandibular nerve
14 Greater and lesser petrosal nerves
15 Basilar artery
16 Vertebral artery
17 Posterior meningeal artery and recurrent meningeal nerve
18 Hypoglossal nerve (n. XII)
19 Medulla oblongata

Base of the skull with cranial nerves and meningeal arteries (internal aspect, schematic drawing).

	Cranial nerves and vessels	Related foramina	Related regions
Anterior cranial fossa	Olfactory nerves (n. I), Anterior ethmoidal artery, vein, and nerve, Anterior meningeal artery	Lamina cribrosa	Nasal cavity
Middle cranial fossa	Optic nerve (n. II), Ophthalmic artery	Optic canal	Orbit
	Oculomotor nerve (n. III), Trochlear nerve (n. IV), Abducent nerve (n. VI), Ophthalmic nerve (n. V_1), Superior ophthalmic vein	Superior orbital fissure	Orbit
	Maxillary nerve (n. V_2)	Foramen rotundum	Pterygopalatine fossa
	Mandibular nerve (n. V_3)	Foramen ovale	Infratemporal fossa
	Middle meningeal artery, Meningeal branch of mandibular nerve (n. V_3)	Foramen spinosum	Infratemporal fossa
	Internal carotid artery	Carotid canal	Cavernous sinus, Base of skull
Posterior cranial fossa	Facial nerve (n. VII), Vestibulocochlear nerve (n. VIII), Artery and vein of the labyrinth	Internal acoustic meatus, Stylomastoid foramen, Facial canal	Inner ear, Face
	Glossopharyngeal nerve (n. IX), Vagus nerve (n. X), Accessory nerve (n. XI), Internal jugular vein, Posterior meningeal artery	Jugular foramen	Parapharyngeal region
	Hypoglossal nerve (n. XII)	Hypoglossal canal	Tongue
	Accessory nerve (n. XI, spinal root), Vertebral arteries, Anterior and posterior spinal arteries, Medulla oblongata	Foramen magnum	Base of skull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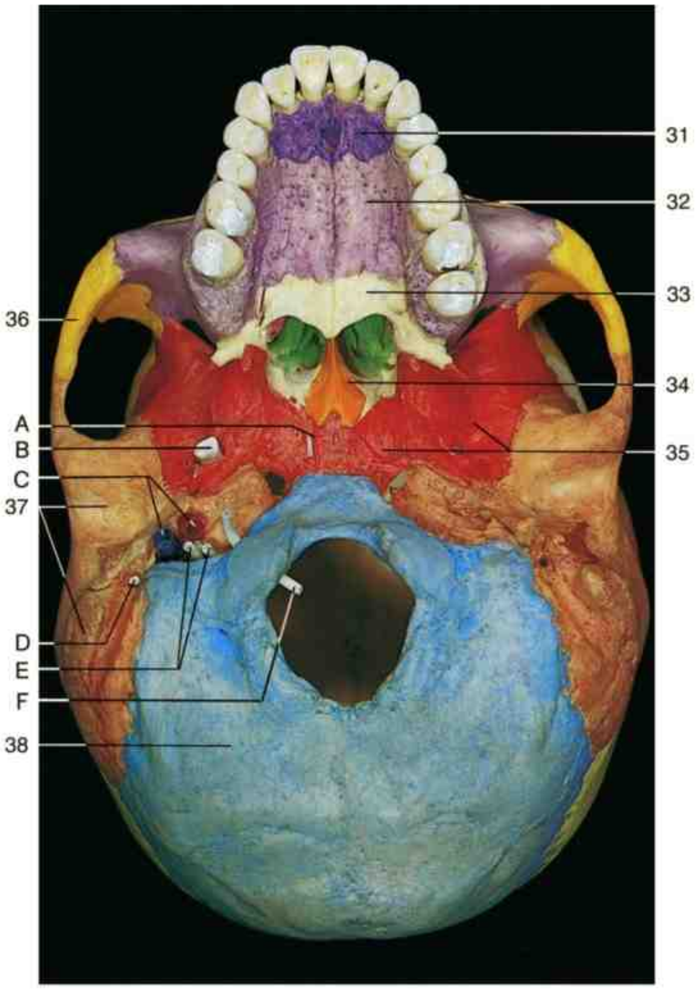
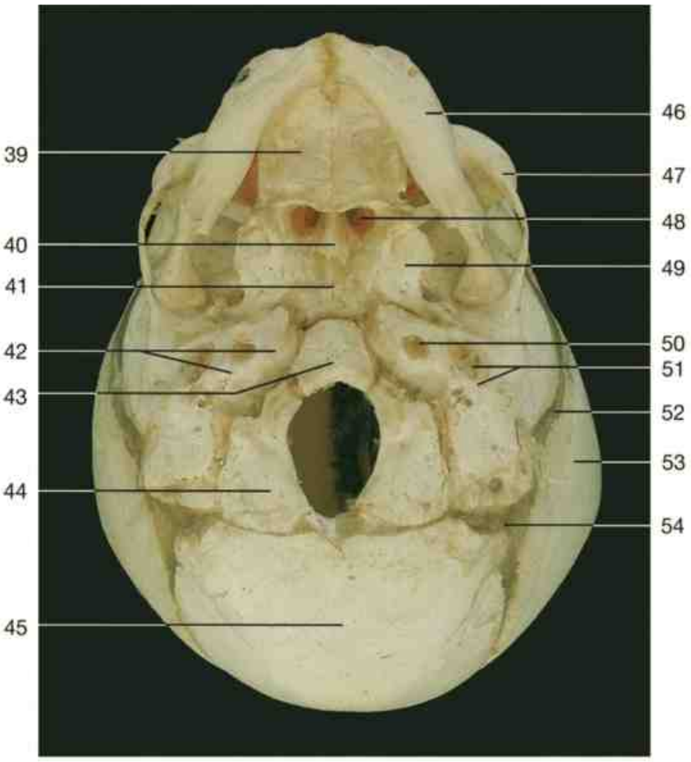
Base of the skull (inferior aspect).



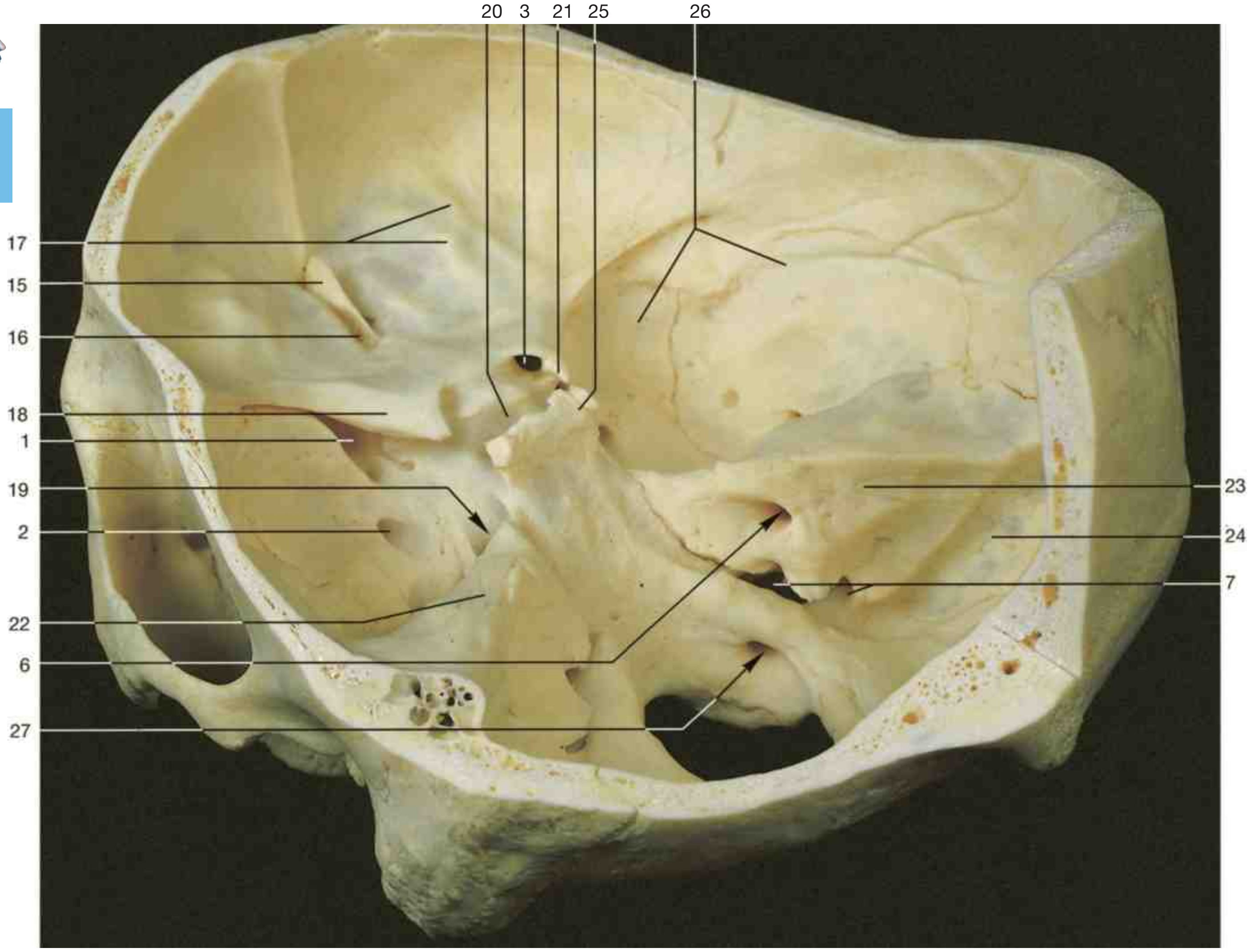
Base of the skull (from below). The individual bones are indicated by different colors.

A = **pterygoid canal**
B = **foramen ovale**
C = internal carotid artery within **carotid canal** and internal jugular vein within the venous part of jugular foramen
D = **stylomastoid foramen** (facial nerve)
E = **jugular foramen** (glossopharyngeal, vagus and accessory nerves)
F = **hypoglossal canal** (hypoglossal nerve)

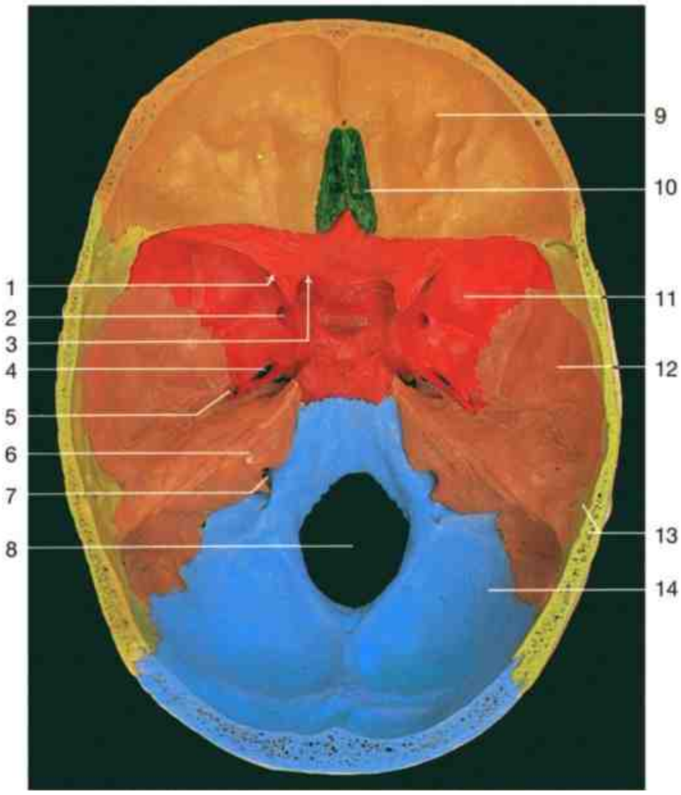


Skull of the newborn (inferior aspect).

1 Incisive canal
2 Median palatine suture
3 Palatine process of maxilla
4 Palatomaxillary suture
5 Greater and lesser palatine foramina
6 Inferior orbital fissure
7 Middle concha (process of ethmoidal bone)
8 Vomer
9 Foramen ovale
10 Groove for auditory tube
11 Pterygoid canal
12 Styloid process
13 Carotid canal
14 Stylomastoid foramen
15 Jugular foramen
16 Groove for occipital artery
17 Occipital condyle
18 Condylar canal
19 Nuchal plane
20 External occipital protuberance
21 Zygomatic arch
22 Lateral pterygoid plate
23 Medial pterygoid plate
24 Mandibular fossa
25 Pharyngeal tubercle
26 Superior nuchal line
27 Mastoid process
28 Inferior nuchal line
29 Mastoid notch
30 Foramen magnum
31 Incisive bone or premaxilla (dark violet)
32 Maxilla (violet)
33 Palatine bone (white)
34 Vomer (orange)
35 Sphenoidal bone (red)
36 Zygomatic bone (yellow)
37 Temporal bone (brown)
38 Occipital bone (blue)
39 Palatine process of maxilla
40 Vomer
41 Sphenoidal bone
42 Petrous part of temporal bone
43 Basilar part
44 Lateral part } of occipital bone
45 Squamous part
46 Mandible
47 Zygomatic arch
48 Choana
49 Pterygoid process of sphenoidal bone
50 Carotid canal
51 External acoustic meatus (tympanic anulus)
52 Sphenoidal fontanelle
53 Parietal bone
54 Mastoid fontanelle



Base of the skull (internal aspect, oblique lateral view from left side).



Canals, fissures, and foramina of the base of the skull

1 Superior orbital fissure
2 Foramen rotundum
3 Optic canal
4 Foramen ovale
5 Foramen spinosum
6 Internal acoustic meatus
7 Jugular foramen
8 Foramen magnum

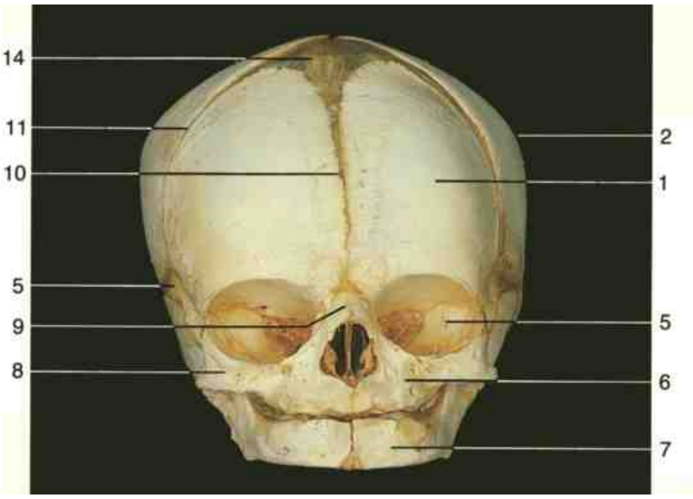
Bones

9 Frontal bone (orange)
10 Ethmoidal bone (dark green)
11 Sphenoidal bone (red)
12 Temporal bone (brown)
13 Parietal bone (yellow)
14 Occipital bone (blue)

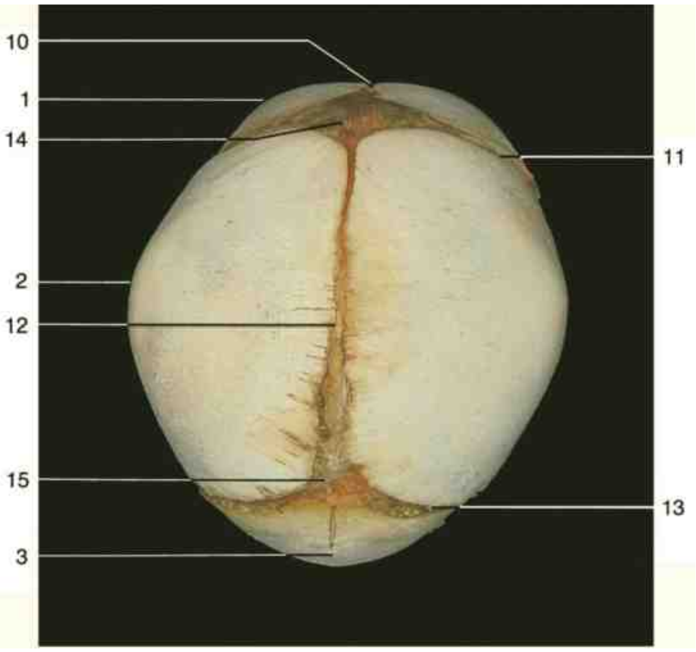
Details of bones

15 Crista galli
16 Cribriform plate
17 Digitate impressions (frontal bone)
18 Lesser wing of sphenoidal bone
19 Foramen lacerum
20 Hypophysial fossa (sella turcica)
21 Anterior clinoid process
22 Trigeminal impression
23 Petrous part of temporal bone
24 Groove for sigmoid sinus
25 Dorsum sellae (posterior clinoid process)
26 Greater wing of sphenoidal bone, groove for middle meningeal artery
27 Hypoglossal canal

Base of the skull (internal aspect, superior view). Individual bones indicated by color.



Skull of the newborn (anterior aspect).



Skull of the newborn (superior aspect). Calvaria.

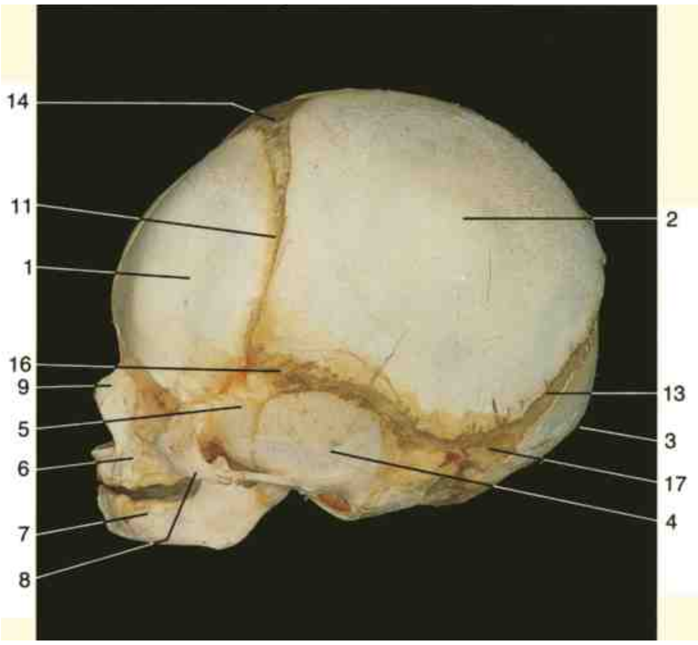
Cranial skeleton
1 Frontal tuber or eminence
2 Parietal tuber or eminence
3 Occipital tuber or eminence
4 Squamous part of temporal bone
5 Greater wing of sphenoidal bone

Facial skeleton
6 Maxilla
7 Mandible
8 Zygomatic bone
9 Nasal bone

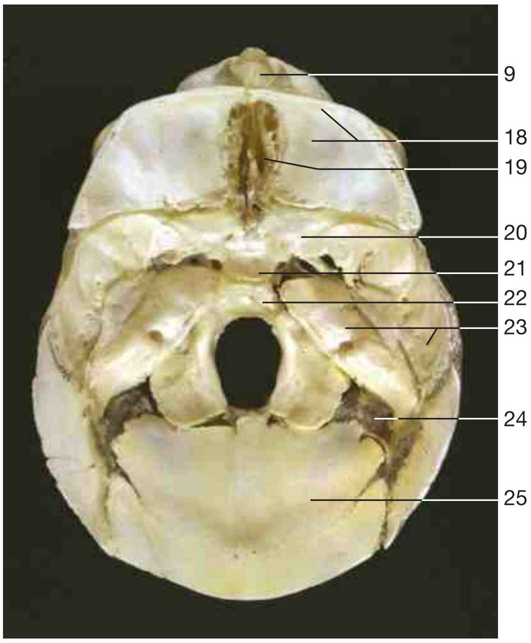
Sutures and fontanelles
10 Frontal suture
11 Coronal suture
12 Sagittal suture
13 Lambdoid suture
14 Anterior fontanelle
15 Posterior fontanelle
16 Sphenoidal (anterolateral) fontanelle
17 Mastoid (posterolateral) fontanelle

Base of the skull
18 Frontal bone
19 Ethmoidal bone
20 Sphenoidal bone
21 Hypophysial fossa (sella turcica)
22 Dorsum sellae
23 Temporal bone
24 Mastoid (posterolateral) fontanelle
25 Occipital bone

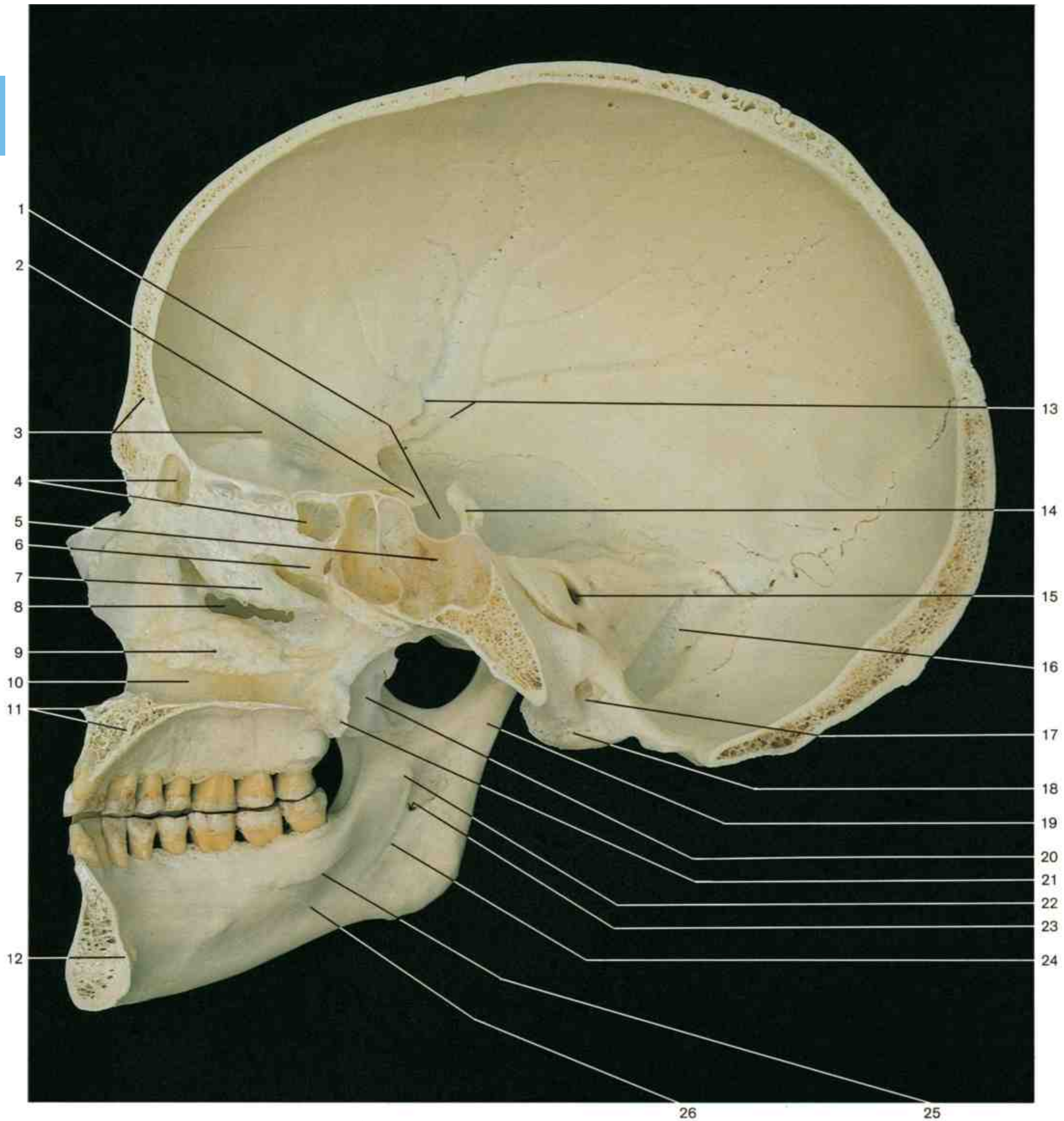
In the newborn, the facial skeleton, in contrast to the cranial skeleton, appears relatively small. There are no teeth presenting. The bones of the cranium are separated by wide fontanelles.



Skull of the newborn (lateral aspect).



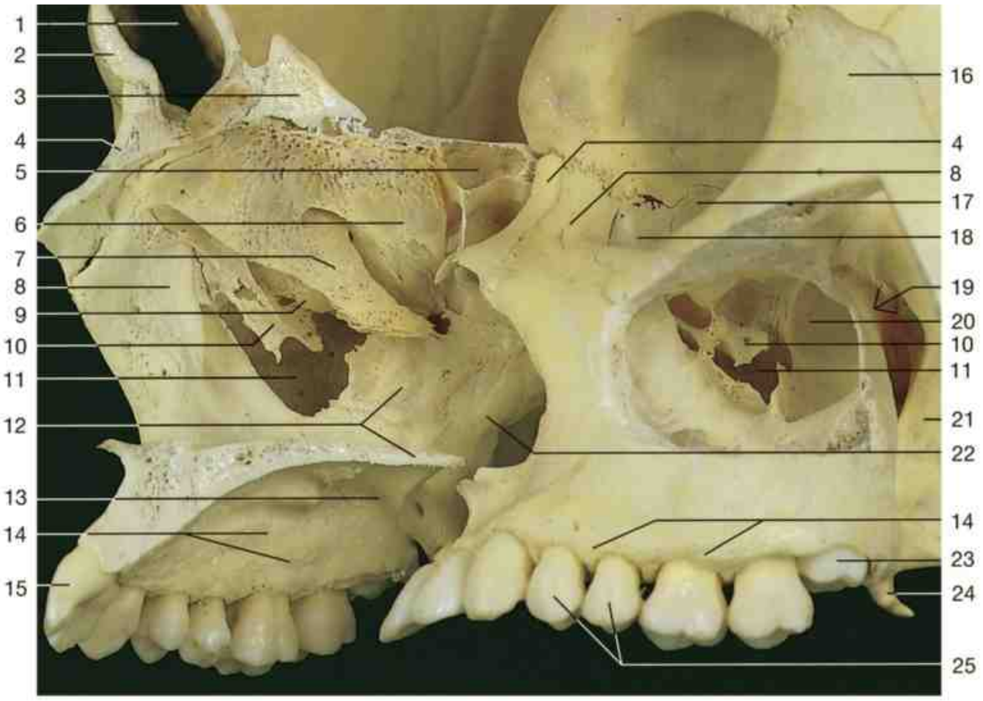
Base of the skull of the newborn (internal aspect).



Median section through the skull, right half (internal aspect).

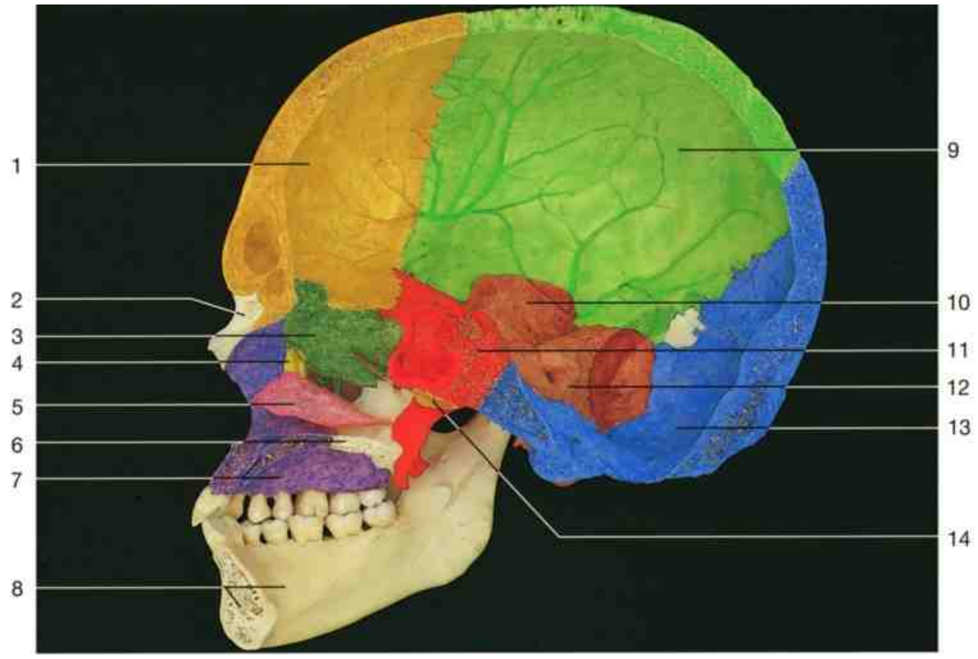
1 Hypophysial fossa (sella turcica)
2 Anterior clinoid process
3 Frontal bone
4 Ethmoidal air cells
5 Sphenoidal sinus
6 Superior concha
7 Middle concha
8 Maxillary hiatus
9 Inferior concha
10 Inferior meatus
11 Anterior nasal spine and maxilla
12 Mental spine or genial tubercle
13 Groove for middle meningeal artery

14 Dorsum sellae
15 Internal acoustic meatus
16 Groove for sigmoid sinus
17 Hypoglossal canal
18 Occipital condyle
19 Condylar process
20 Lateral pterygoid plate } of pterygoid process
21 Medial pterygoid plate } of pterygoid process
22 Lingula of mandible
23 Mandibular foramen
24 Mylohyoid groove
25 Mylohyoid line
26 Submandibular fovea



Facial part of the skull (viscerocranium), divided in two halves (lateral and medial aspect). Right inferior concha has been removed to show the maxillary hiatus. Left maxillary sinus opened.

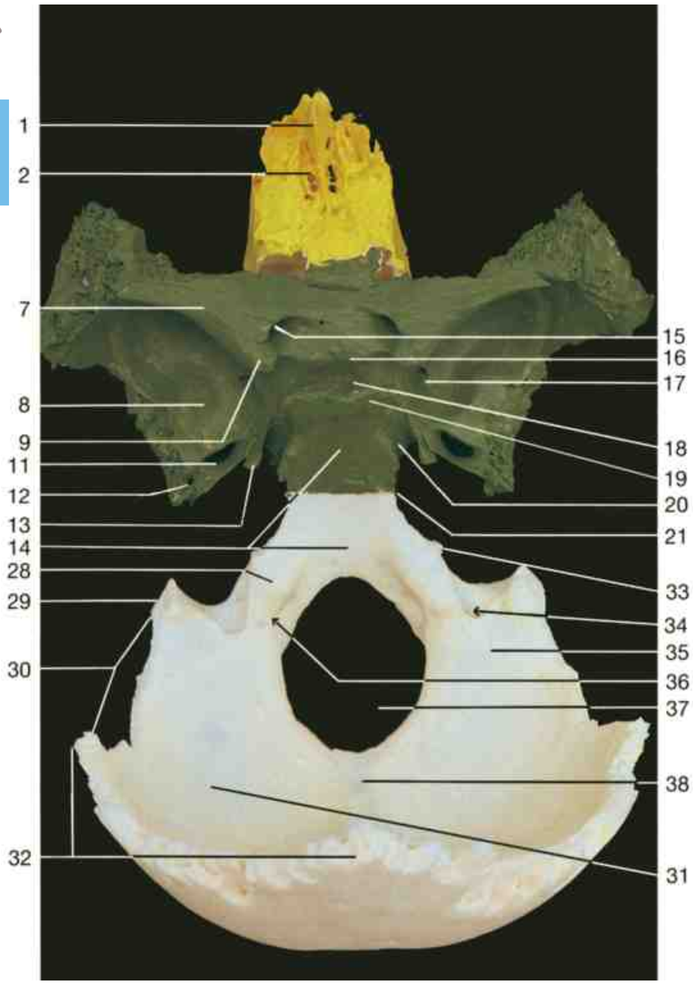
1 Frontal sinus
2 Frontal bone
3 Crista galli
4 Nasal bone
5 Sphenoidal sinus
6 Superior concha
7 Middle concha } of ethmoidal bone
8 Frontal process of maxilla
9 Ethmoidal bulla
10 Uncinate process
11 Maxillary hiatus
12 Palatine bone
13 Greater palatine foramen
14 Alveolar process of maxilla
15 Central incisor
16 Zygomatic bone
17 Ethmoidal bone
18 Lacrimal bone
19 Pterygopalatine fossa
20 Maxillary sinus
21 Lateral pterygoid plate
22 Medial pterygoid plate
23 Third molar tooth
24 Pterygoid hamulus
25 Two premolar teeth



Median section through the skull. The nasal septum has been removed. Bones indicated by colors.

Bones (indicated by colors)
1 Frontal bone (yellow)
2 Nasal bone (white)
3 Ethmoidal bone (dark green)
4 Lacrimal bone (yellow)
5 Inferior nasal concha (pink)
6 Palatine bone (white)
7 Maxilla (violet)
8 Mandible (white)
9 Parietal bone (light green)
10 Temporal bone (brown)
11 Sphenoidal bone (red)
12 Petrous part of temporal bone (brown)
13 Occipital bone (blue)
14 Ala of vomer (light brown)

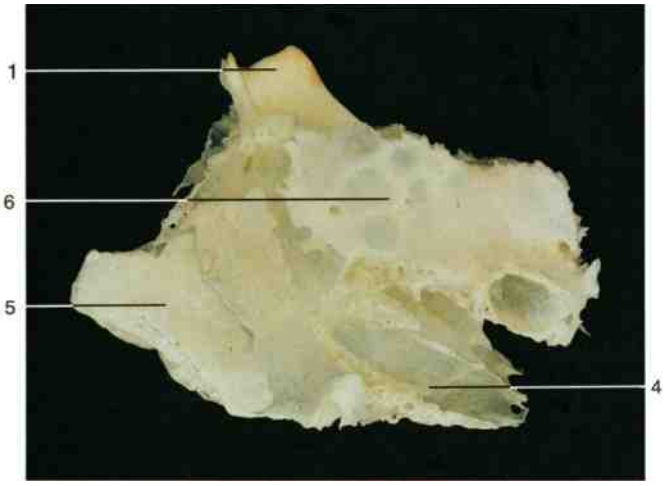
Because of the upright posture that the human developed in the course of evolution, the cranial cavity greatly increased in size, whereas the facial skeleton decreased. As a result, the base of the skull developed an angulation of about 120° between the clivus and the cribriform plate (see drawing on page 19). The hypophysial fossa containing the pituitary gland lies at the angle formed between these two planes.



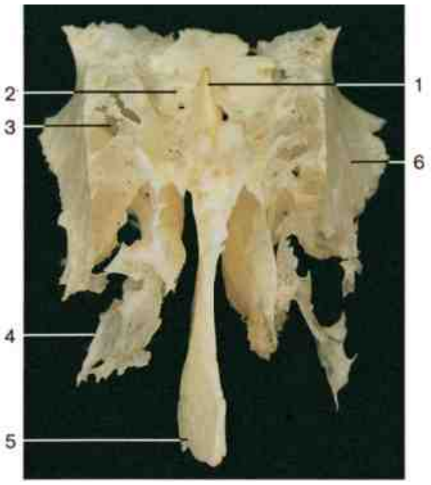
Part of the disarticulated base of the skull.
Ethmoidal, sphenoidal, and occipital bones (from above).
Green = sphenoidal bone; yellow = ethmoidal bone.

Ethmoidal bone
1 Crista galli
2 Cribriform plate
3 Ethmoidal air cells
4 Middle concha
5 Perpendicular plate (part of nasal septum)
6 Orbital plate

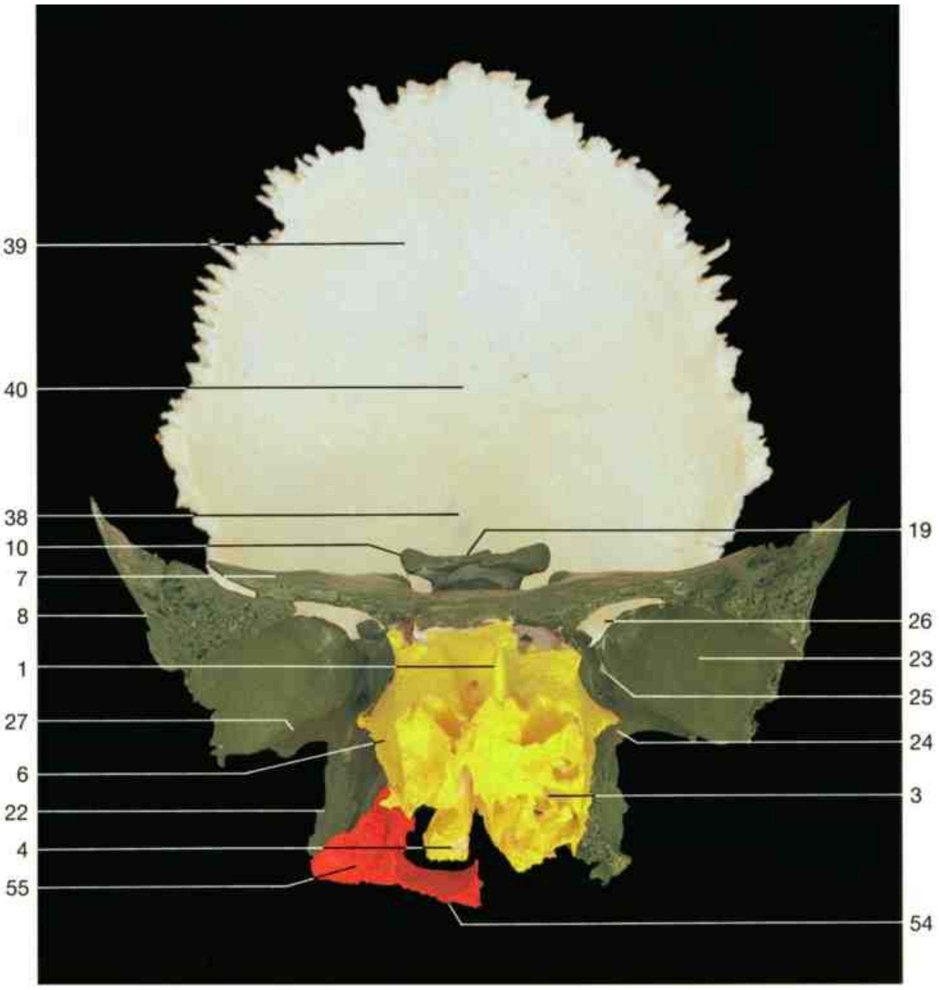
Sphenoidal bone
7 Lesser wing
8 Greater wing
9 Anterior clinoid process
10 Posterior clinoid process
11 Foramen ovale
12 Foramen spinosum
13 Lingula of the sphenoidal bone
14 Clivus
15 Optic canal
16 Tuberculum sellae
17 Foramen rotundum (right side)
18 Hypophysial fossa (sella turcica)
19 Dorsum sellae
20 Carotid sulcus
21 Spheno-occipital synchondrosis
22 Lateral pterygoid plate
23 Greater wing of sphenoidal bone (orbital surface)
24 Greater wing of sphenoidal bone (maxillary surface)
25 Foramen rotundum (left side)
26 Superior orbital fissure
27 Infratemporal crest of the greater wing



Ethmoidal bone (lateral aspect), posterior portion to the right.



Ethmoidal bone (anterior aspect).

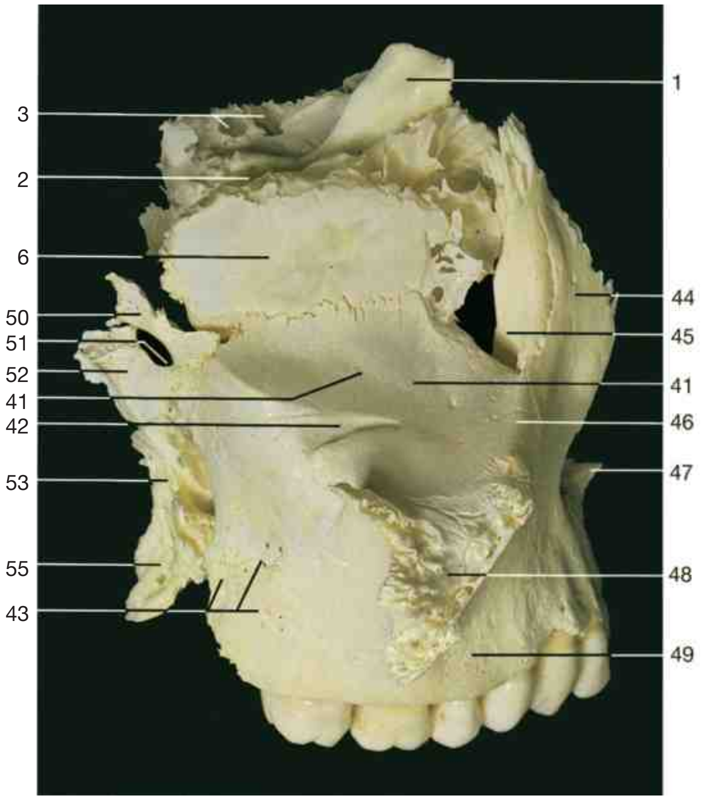


Disarticulated base of the skull (anterior aspect). Green = sphenoidal bone; yellow = ethmoidal bone; red = palatine bone.

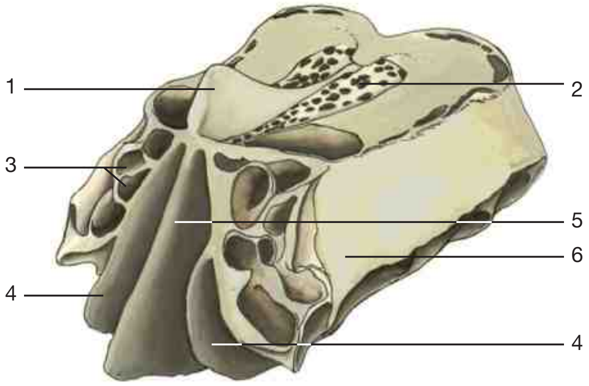
Occipital bone
28 Jugular tubercle
29 Jugular process
30 Mastoid margin
31 Posterior cranial fossa
32 Lambdoid margin
33 Intrajugular process
34 Condylar canal
35 Lateral part of occipital bone
36 Hypoglossal canal
37 Foramen magnum
38 Internal occipital crest
39 Squamous part of occipital bone
40 Internal occipital protuberance

Maxilla
41 Orbital surface
42 Infra-orbital groove
43 Maxillary tuberosity with foramina
44 Frontal process
45 Nasolacrimal groove
46 Infra-orbital margin
47 Anterior nasal spine
48 Zygomatic process
49 Alveolar process

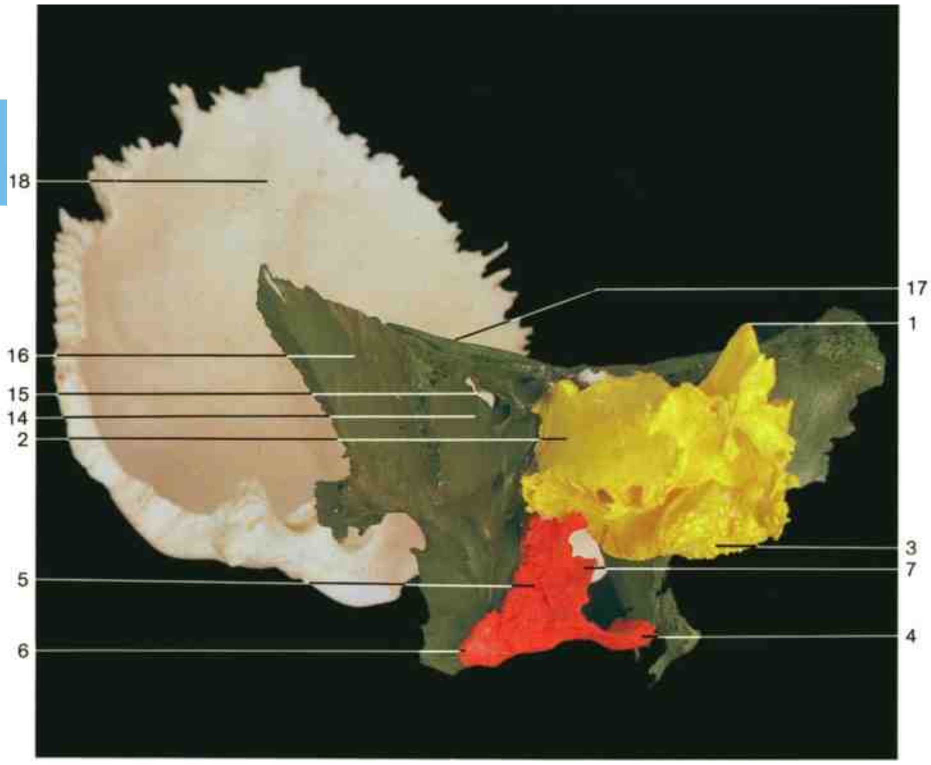
Palatine bone
50 Orbital process
51 Sphenopalatine notch
52 Sphenoidal process
53 Perpendicular plate
54 Horizontal plate
55 Pyramidal process



Right maxilla, ethmoidal, and palatine bone (lateral aspect).



Ethmoidal bone (oblique anterior aspect). (Schematic drawing.)



Part of a disarticulated skull base, similar to the preceding figures, but with palatine bone. Green = sphenoidal bone; yellow = ethmoidal bone; red = palatine bone.

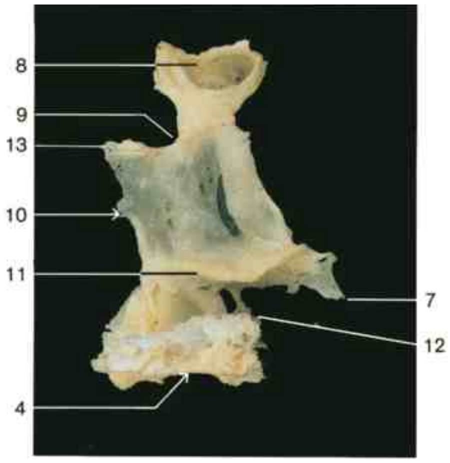
Ethmoidal bone
1 Crista galli
2 Orbital plate
3 Middle concha

Palatine bone
4 Horizontal plate of palatine bone
5 Greater palatine canal
6 Pyramidal process
7 Maxillary process
8 Orbital process
9 Sphenopalatine notch
10 Perpendicular plate of palatine bone
11 Conchal crest
12 Nasal crest
13 Sphenoidal process

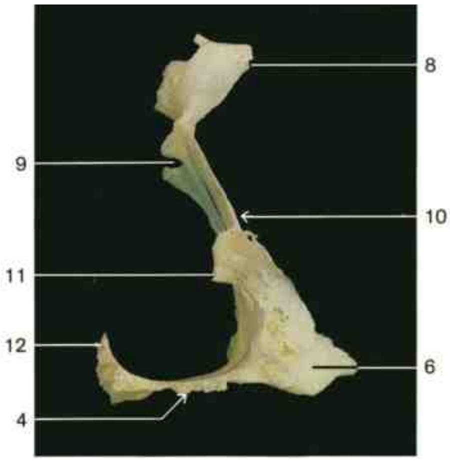
Sphenoidal bone
14 Greater wing
15 Superior orbital fissure
16 Greater wing (orbital surface)
17 Lesser wing

Occipital bone
18 Squamous part of occipital bone

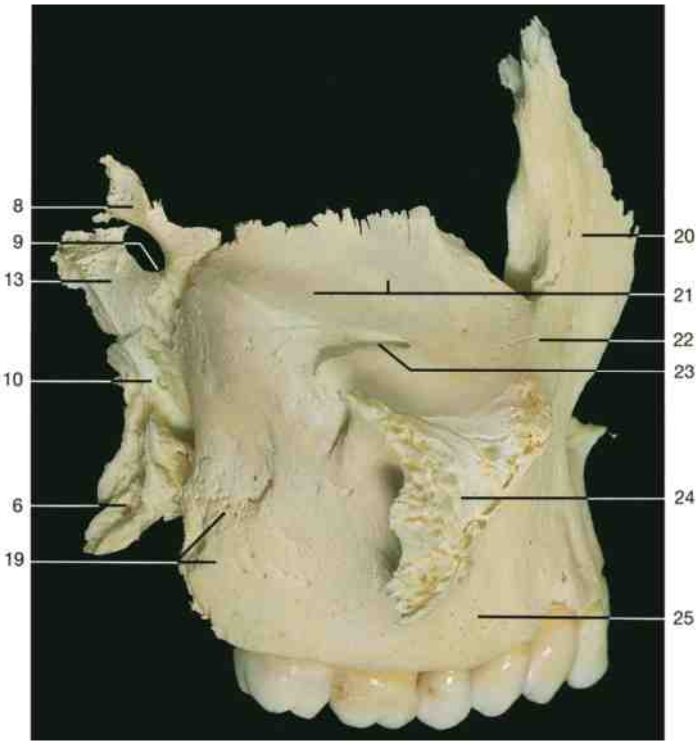
Maxilla
19 Maxillary tuberosity
20 Frontal process
21 Orbital surface
22 Infra-orbital margin
23 Infra-orbital groove
24 Zygomatic process
25 Alveolar process



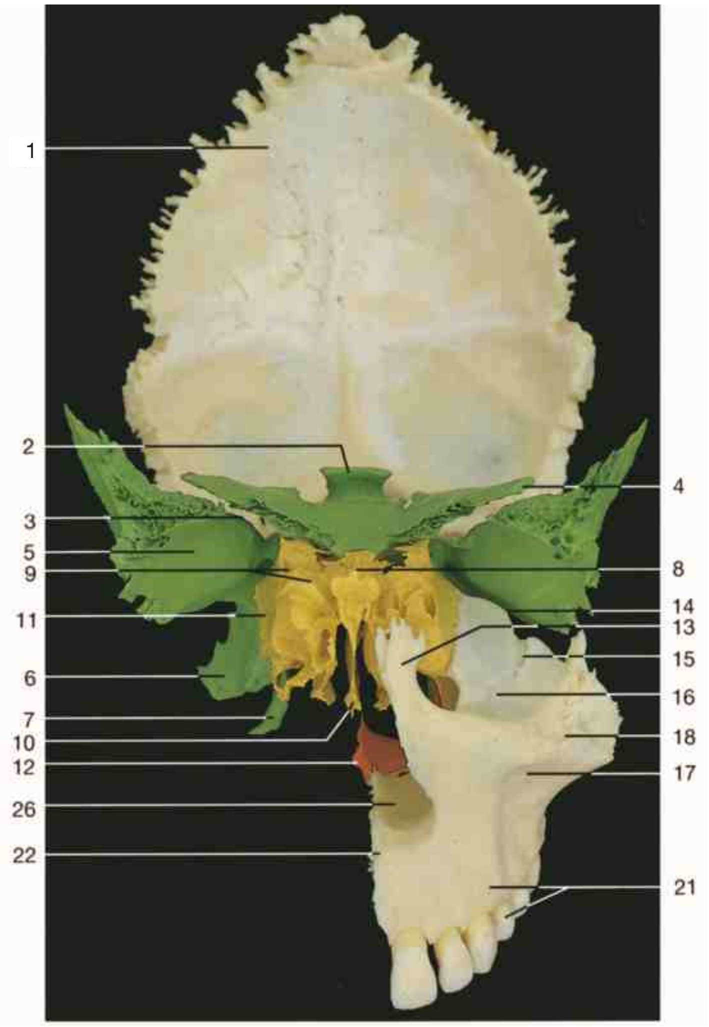
Left palatine bone (medial aspect, posterior aspect to the left).



Left palatine bone (anterior aspect).



Right maxilla and right palatine bone (lateral aspect).



Part of a disarticulated skull.
The left **maxilla** is added to the preceding specimen.

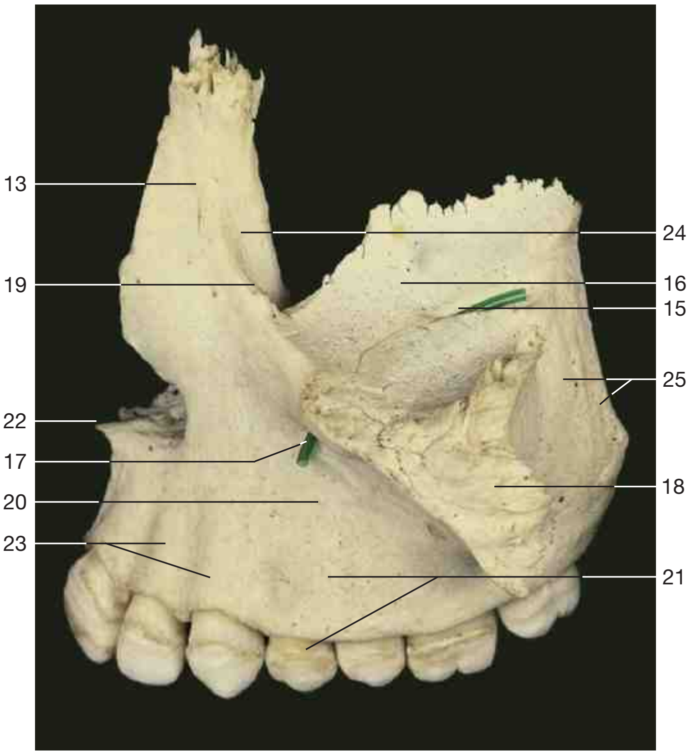
Occipital bone
1 Squamous part

Sphenoidal bone
2 Dorsum sellae
3 Superior orbital fissure
4 Lesser wing
5 Greater wing (orbital surface)
6 Lateral pterygoid plate
7 Medial pterygoid plate

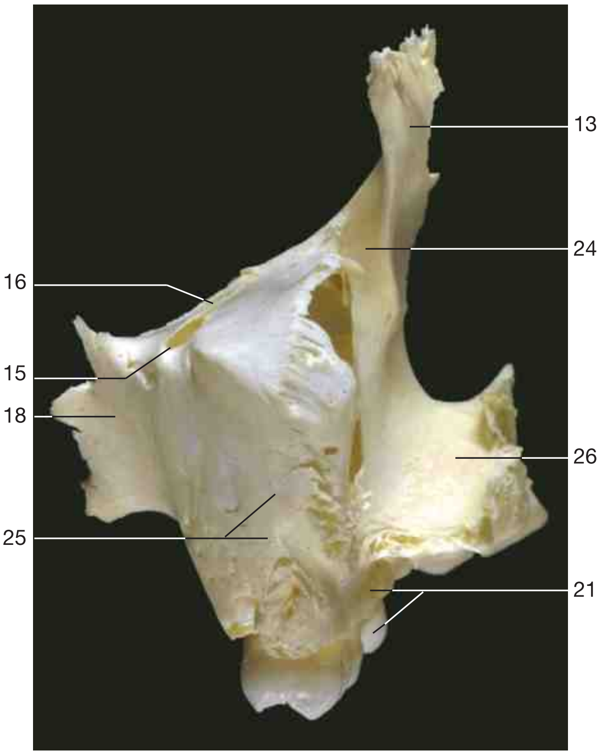
Ethmoidal bone
8 Crista galli
9 Ethmoidal air cells
10 Perpendicular plate
11 Orbital plate

Palatine bone
12 Horizontal plate (nasal crest)

Maxilla
13 Frontal process
14 Inferior orbital fissure
15 Infra-orbital groove
16 Orbital surface
17 Infra-orbital foramen
18 Zygomatic process
19 Anterior lacrimal crest
20 Canine fossa
21 Alveolar process with teeth
22 Anterior nasal spine
23 Juga alveolaria (elevations formed by roots of teeth)
24 Lacrimal groove
25 Maxillary tuberosity with alveolar foramina
26 Palatine process of maxilla

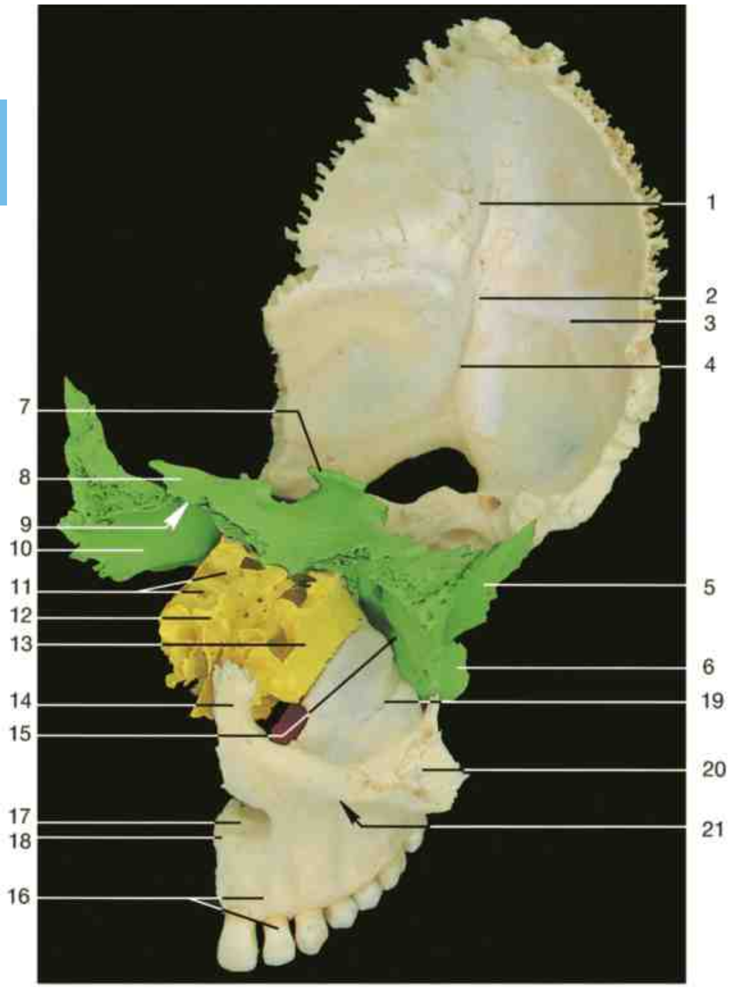


Left maxilla (lateral aspect). Probe = infra-orbital canal.

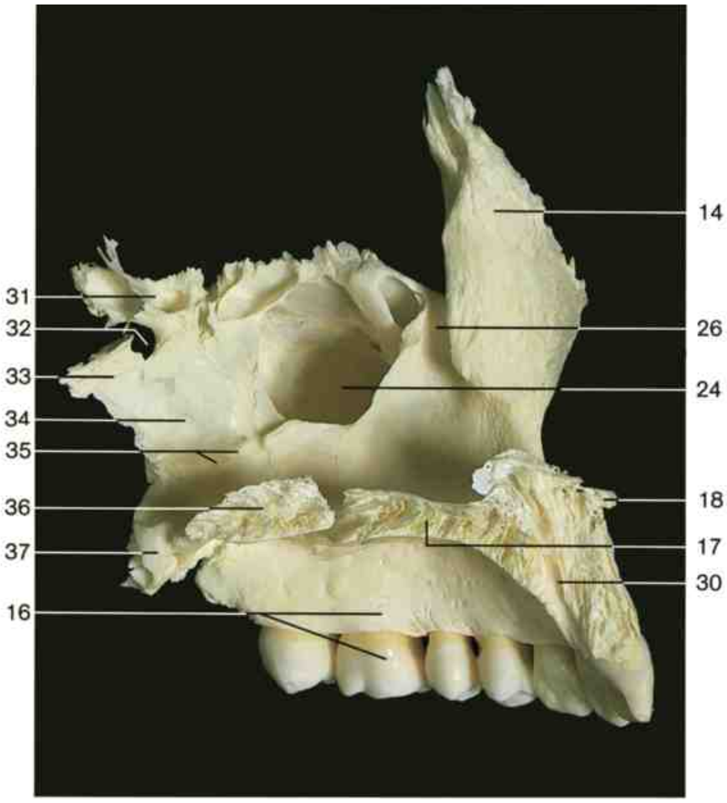


Left maxilla (posterior aspect).

Disarticulated Skull II: Palatine Bone and Maxilla



Part of a disarticulated base of skull. The mosaic of the facial bones [sphenoidal bone (green), ethmoidal bone (yellow), and palatine bone (red)] is seen from the antero-lateral aspect.



Left maxilla and palatine bone (medial aspect).

Occipital bone
1 Groove for superior sagittal sinus
2 Internal occipital protuberance
3 Groove for transverse sinus
4 Internal occipital crest

Sphenoidal bone
5 Greater wing (temporal surface)
6 Lateral pterygoid plate
7 Dorsum sellae
8 Lesser wing
9 Superior orbital fissure
10 Greater wing (orbital surface)

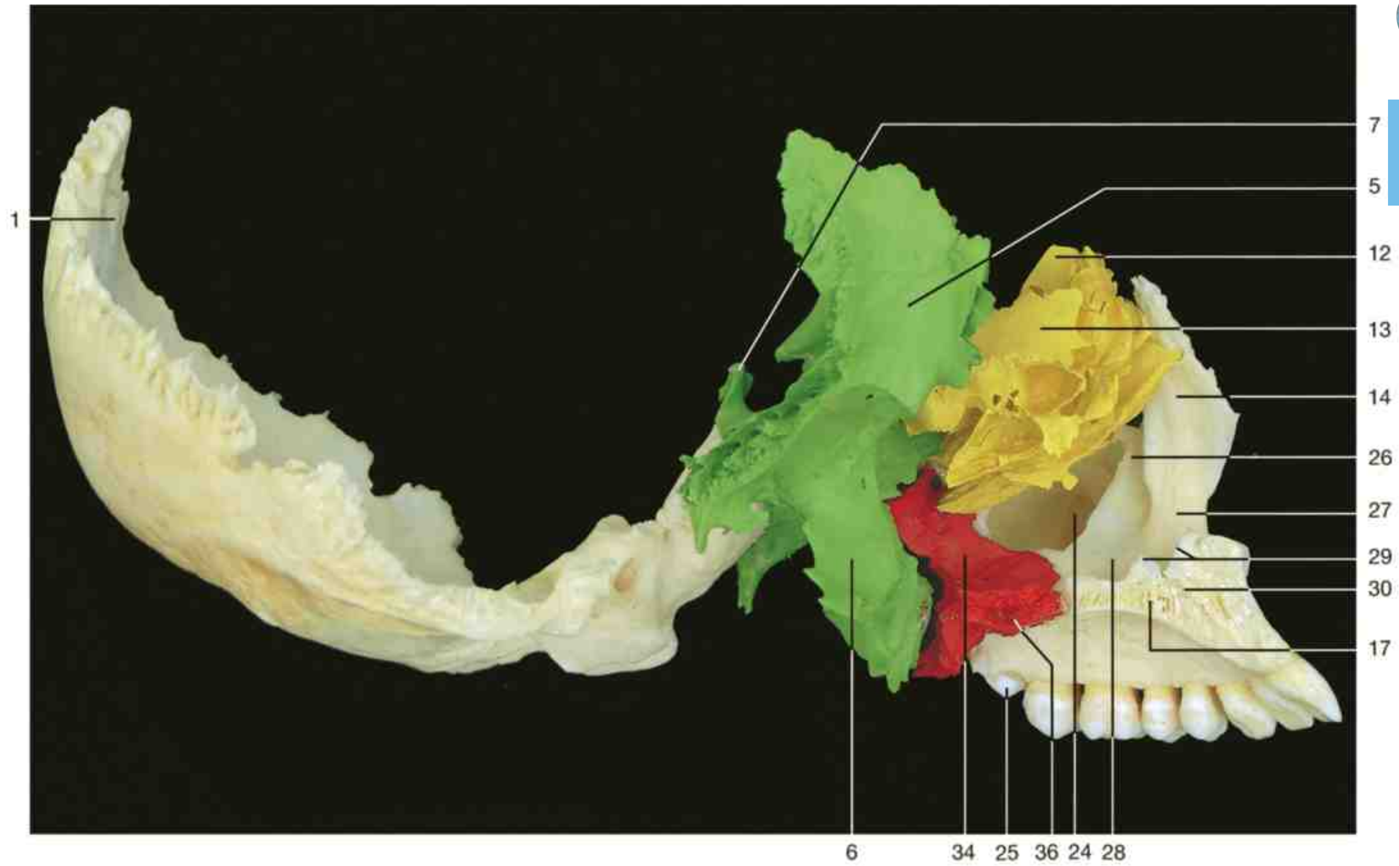
Ethmoidal bone
11 Ethmoidal air cells
12 Crista galli
13 Orbital plate

Maxilla
14 Frontal process
15 Inferior orbital fissure
16 Alveolar process with teeth
17 Palatine process
18 Anterior nasal spine
19 Infra-orbital groove
20 Zygomatic process
21 Location of infra-orbital foramen
22 Middle nasal meatus
23 Inferior nasal meatus
24 Maxillary hiatus (leading to maxillary sinus)
25 Third molar
26 Lacrimal groove
27 Conchal crest
28 Body of maxilla (nasal surface)
29 Nasal crest
30 Incisive canal

Palatine bone
31 Orbital process
32 Sphenopalatine notch
33 Sphenoidal process
34 Perpendicular plate
35 Conchal crest
36 Horizontal plate
37 Pyramidal process

Frontal bone
38 Squamous part
39 Supra-orbital foramen
40 Frontal notch
41 Frontal spine

Inferior nasal concha
42 Inferior nasal concha with maxillary process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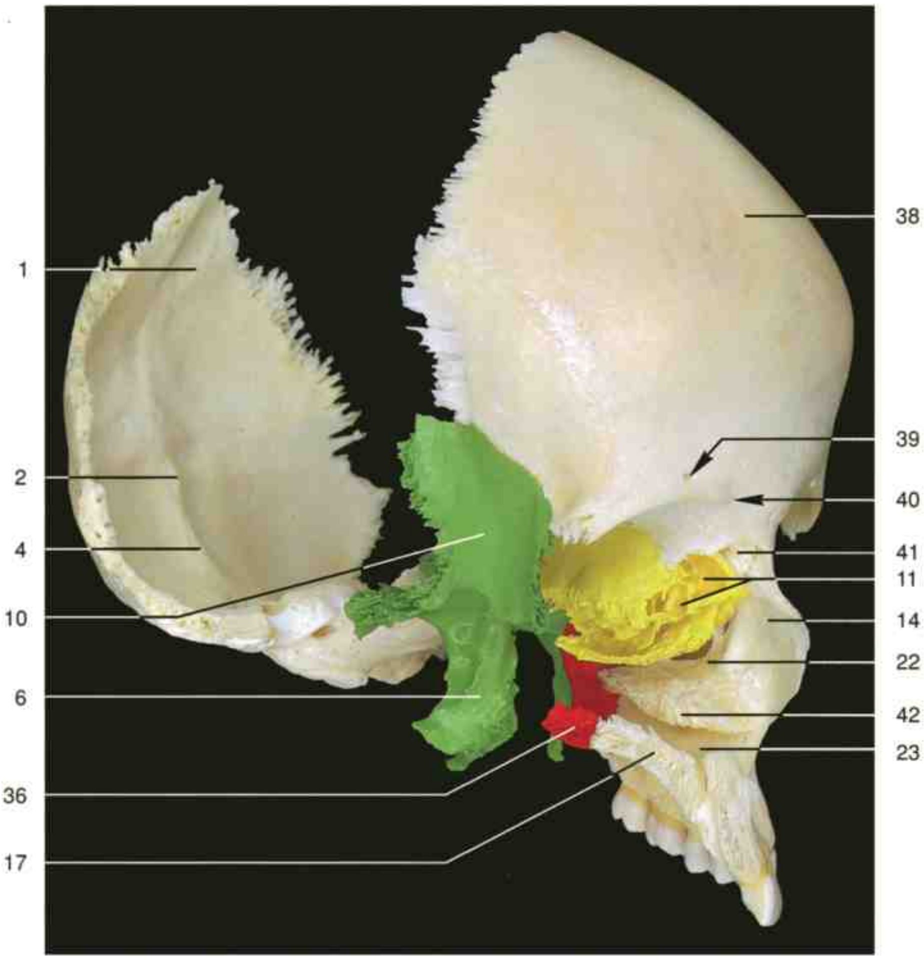
Part of a disarticulated base of skull (medial aspect). Green = sphenoidal bone; yellow = ethmoidal bone; red = palatine bone; natural colored = left maxilla.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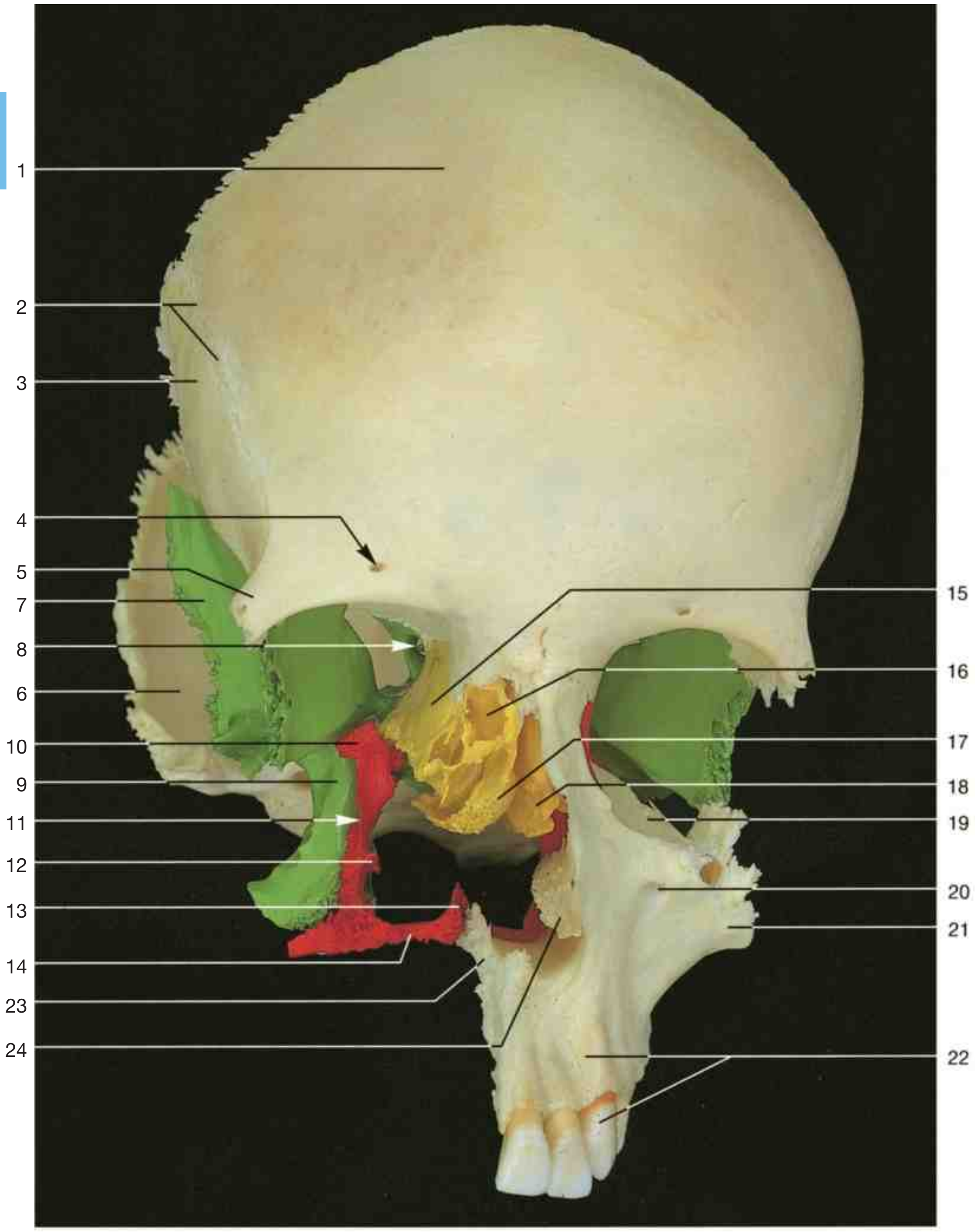
Part of a disarticulated base of skull. The same specimen as shown above but with frontal bone (oblique-lateral aspect).



Part of a disarticulated skull showing the connection of the palatine bone (red) and the maxilla with ethmoidal bone (yellow) and sphenoidal bone (green) (anterior aspect).

Frontal bone
1 Squamous part
2 Inferior temporal line
3 Temporal surface
4 Supra-orbital foramen
5 Zygomatic process

Occipital bone
6 Squamous part

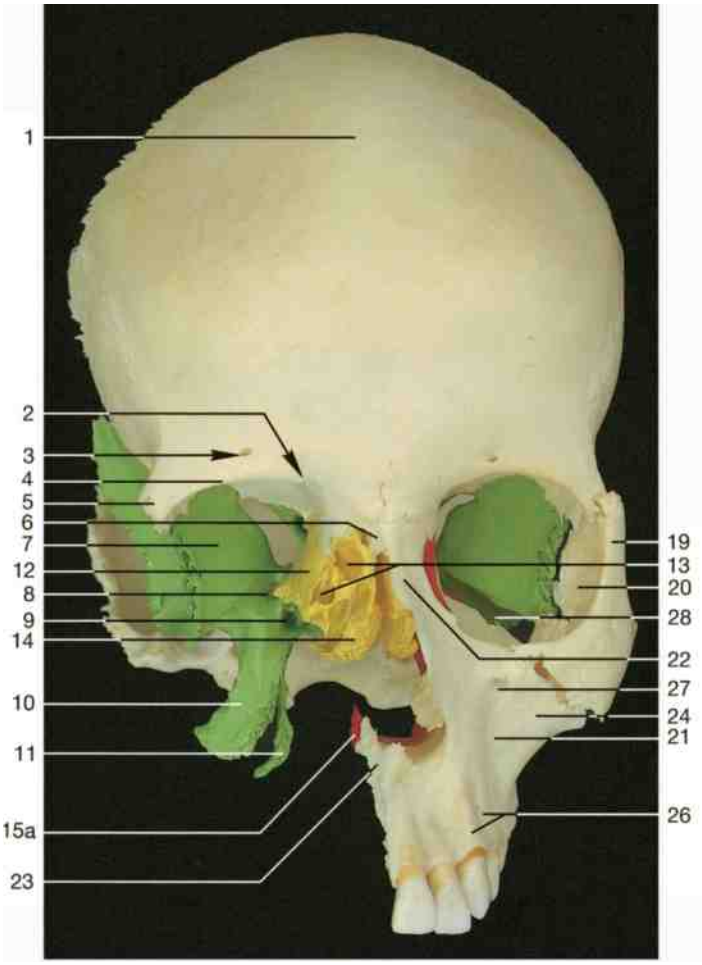
Sphenoidal bone
7 Greater wing (temporal surface)
8 Optic canal within the lesser wing
9 Lateral pterygoid plate

Palatine bone
10 Orbital process
11 Perpendicular plate
12 Conchal crest
13 Nasal crest
14 Horizontal plate

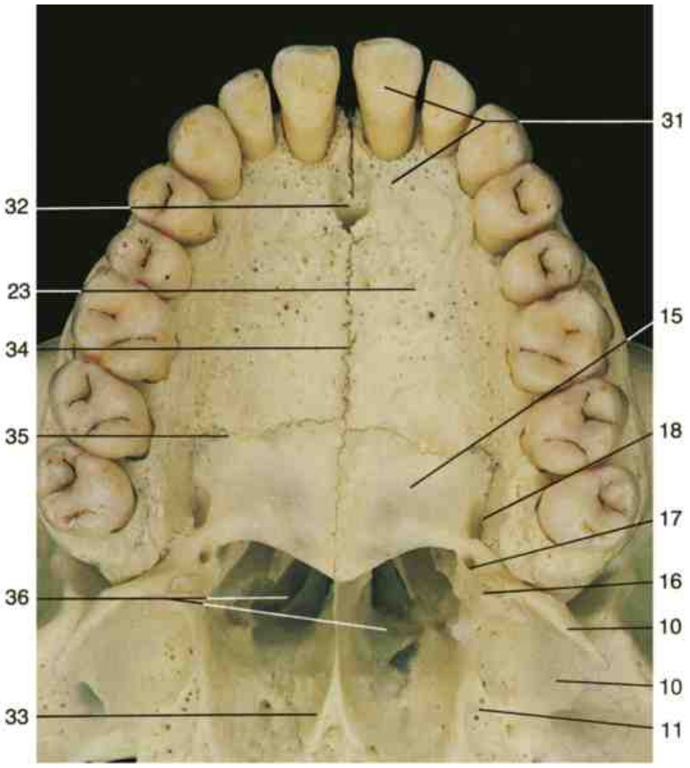
Ethmoidal bone
15 Orbital plate
16 Ethmoidal air cell
17 Middle concha
18 Perpendicular plate (part of bony nasal septum)

Maxilla
19 Infra-orbital groove
20 Infra-orbital foramen
21 Zygomatic process
22 Alveolar process with teeth
23 Palatine process

Left inferior nasal concha
24 Anterior part of inferior concha



Anterior view of a disarticulated skull showing the connection of the maxilla with the frontal and zygomatic bones. Yellow = ethmoidal bone; red = palatine bone; green = sphenoidal bone.



Bony palate and teeth of the maxillae (from below).

Frontal bone
1 Squamous part
2 Frontal notch
3 Supra-orbital foramen
4 Supra-orbital margin
5 Zygomatic process
6 Frontal spine

Sphenoidal bone
7 Greater wing (orbital surface)
8 Foramen rotundum
9 Pterygoid or Vidian canal
10 Lateral pterygoid plate
11 Medial pterygoid plate

Ethmoidal bone
12 Orbital plate
13 Ethmoidal air cells
14 Middle concha

Palatine bone
15 Horizontal plate
15a Nasal crest
16 Pyramidal process
17 Lesser palatine foramen
18 Greater palatine foramen

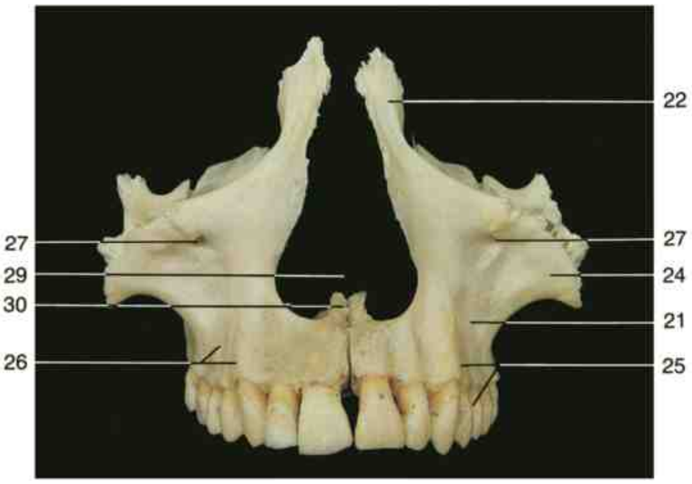
Zygomatic bone
19 Frontal process
20 Orbital surface

Maxilla
21 Canine fossa
22 Frontal process
23 Palatine process
24 Zygomatic process
25 Alveolar process and teeth
26 Juga alveolaria
27 Infra-orbital foramen
28 Infra-orbital groove
29 Anterior nasal aperture
30 Anterior nasal spine

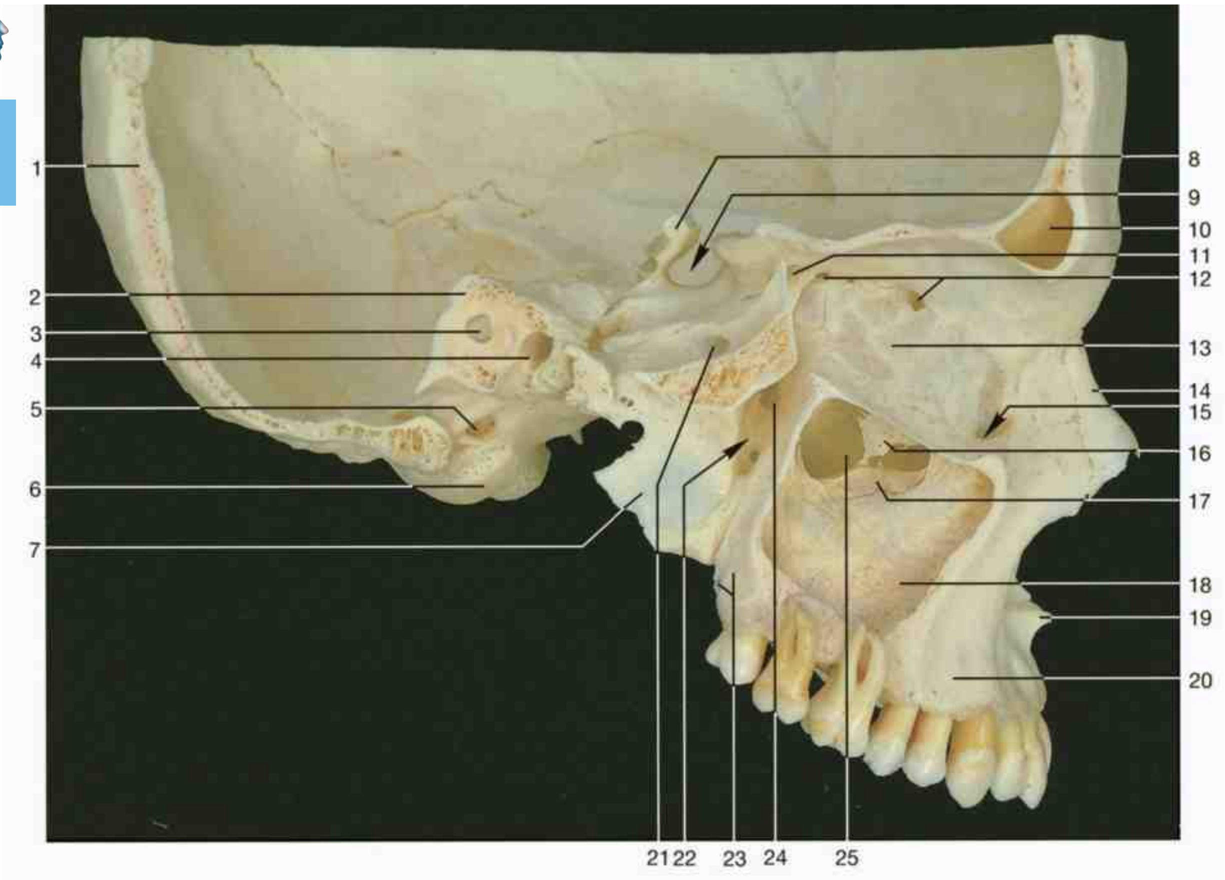
Incisive bone
31 Central incisor and incisive bone or premaxilla
32 Incisive fossa

Vomer
33 Ala of the vomer

Sutures and choanae
34 Median palatine suture
35 Transverse palatine suture
36 Choanae



Anterior view of both maxillae forming the anterior bony aperture of the nose.



Paramedian section through the skull, right side (lateral aspect). Frontal and maxillary sinuses are opened.

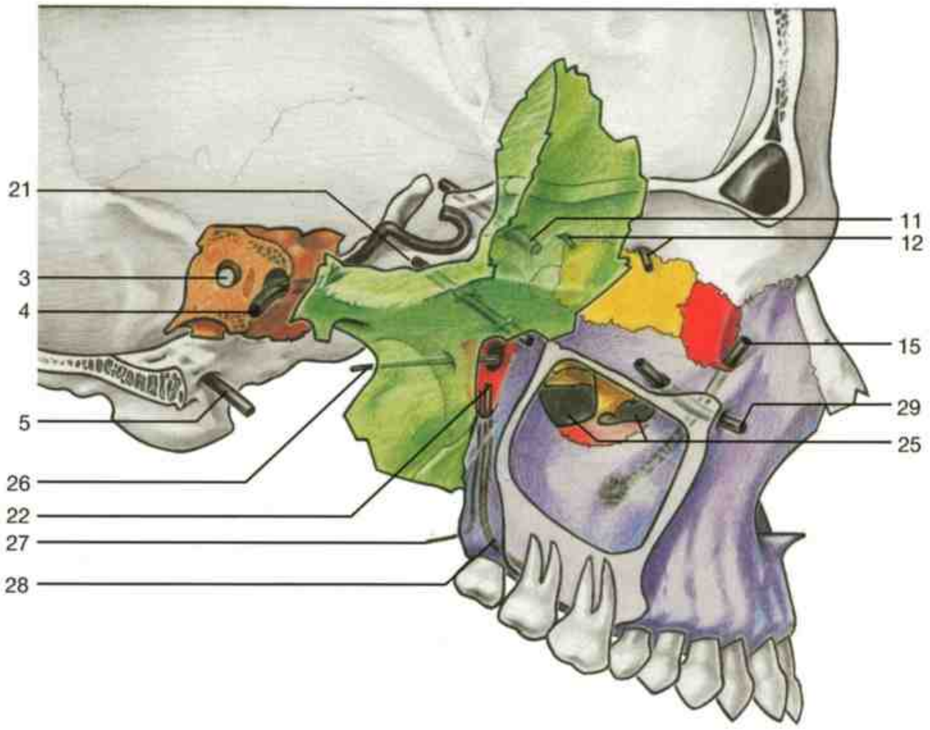
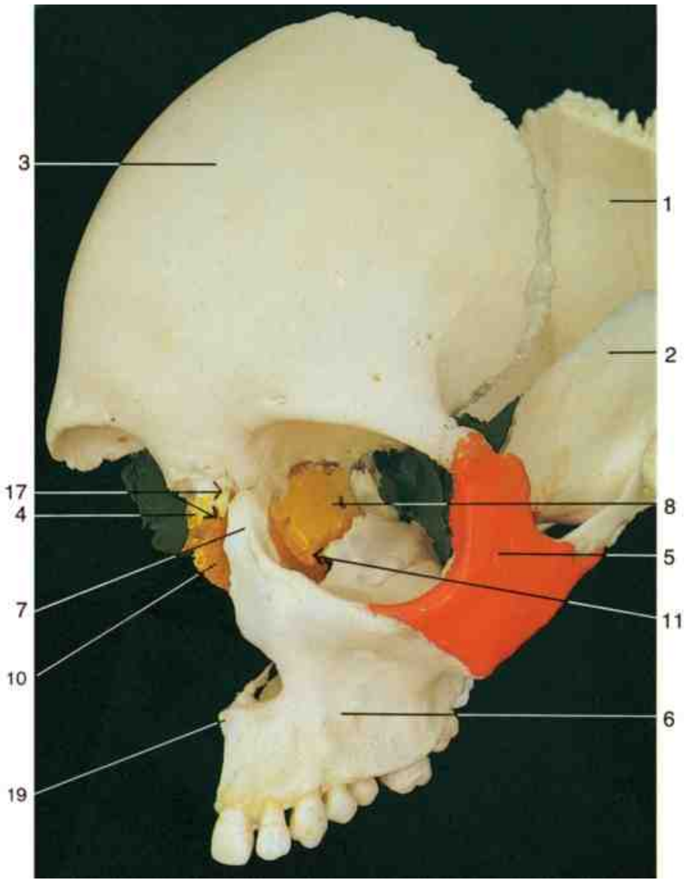


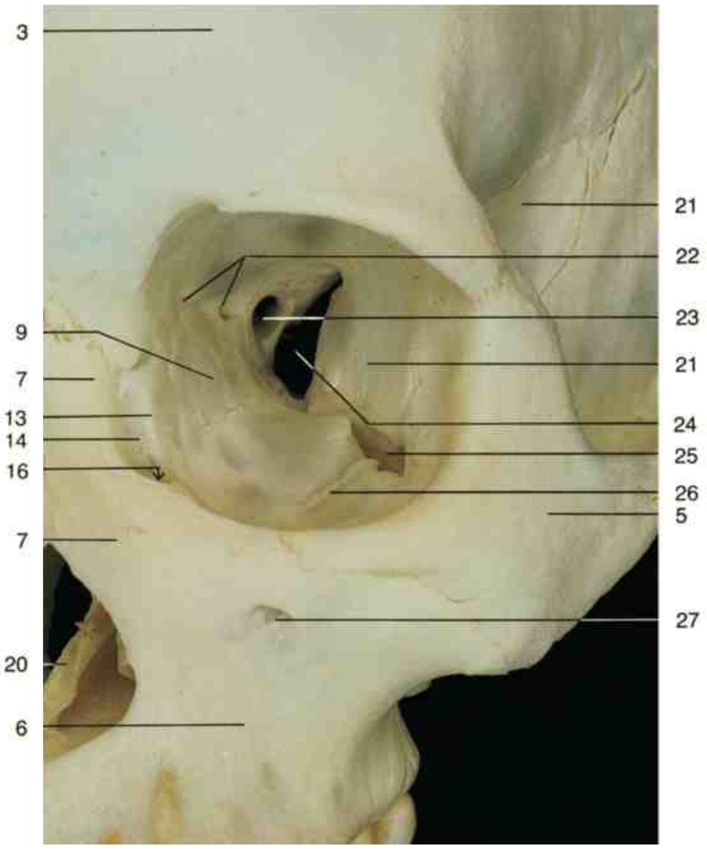
Illustration of canals and foramina connected with the right orbit and pterygopalatine fossa (compare the above figure). The greater wing of sphenoidal bone (green) is shown as being transparent. Brown = temporal bone; yellow = ethmoidal bone; red = lacrimal bone; light red = inferior nasal concha; violet = maxilla; red = palatine bone.

1	Occipital bone
2	Temporal bone (petrous part)
3	Internal acoustic meatus
4	Carotid canal
5	Hypoglossal canal
6	Occipital condyle
7	Lateral plate of pterygoid process
8	Dorsum of sella turcica
9	Sella turcica
10	Frontal sinus
11	Optic canal
12	Posterior and anterior ethmoidal foramina
13	Orbital plate of ethmoidal bone
14	Nasal bone
15	Nasolacrimal canal
16	Uncinate process
17	Inferior nasal concha (maxillary process)
18	Maxillary sinus
19	Anterior nasal spine
20	Alveolar process of maxilla
21	Foramen rotundum
22	Pterygopalatine fossa
23	Tuberosity of maxilla with alveolar foramina
24	Sphenopalatine foramen
25	Maxillary hiatus
26	Pterygoid or Vidian canal
27	Lesser palatine canal
28	Greater palatine canal
29	Infra-orbital canal

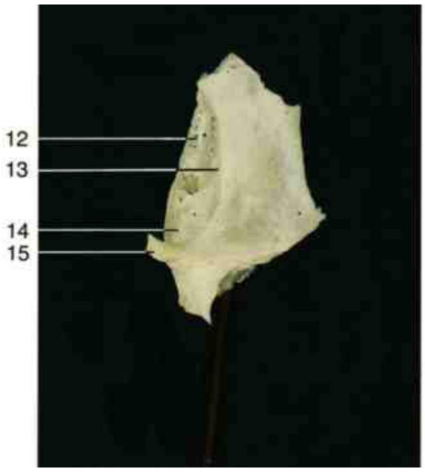


Anterior part of a disarticulated skull.
Orange = zygomatic bone; yellow = ethmoidal bone; dark green = sphenoidal bone. The arrows indicate the locations of the lacrimal bone (11) and the nasal bone (17).

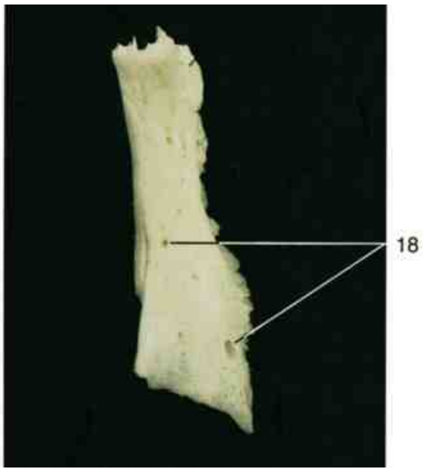
1	Occipital bone
2	Temporal bone
3	Frontal bone
4	Nasal spine of frontal bone
5	Zygomatic bone
6	Maxilla
7	Frontal process of maxilla
8	Ethmoidal bone
9	Orbital plate of ethmoidal bone
10	Perpendicular plate of ethmoidal bone
11	Site of lacrimal bone
12	Lacrimal groove of lacrimal bone
13	Posterior lacrimal crest
14	Fossa for lacrimal sac
15	Lacrimal hamulus
16	Nasolacrimal canal
17	Site of nasal bone
18	Nasal foramina of nasal bone
19	Anterior nasal spine of maxilla
20	Vomer
21	Greater wing of sphenoidal bone
22	Anterior and posterior ethmoidal foramina
23	Optic canal
24	Superior orbital fissure
25	Inferior orbital fissure
26	Infra-orbital groove
27	Infra-orbital foramen



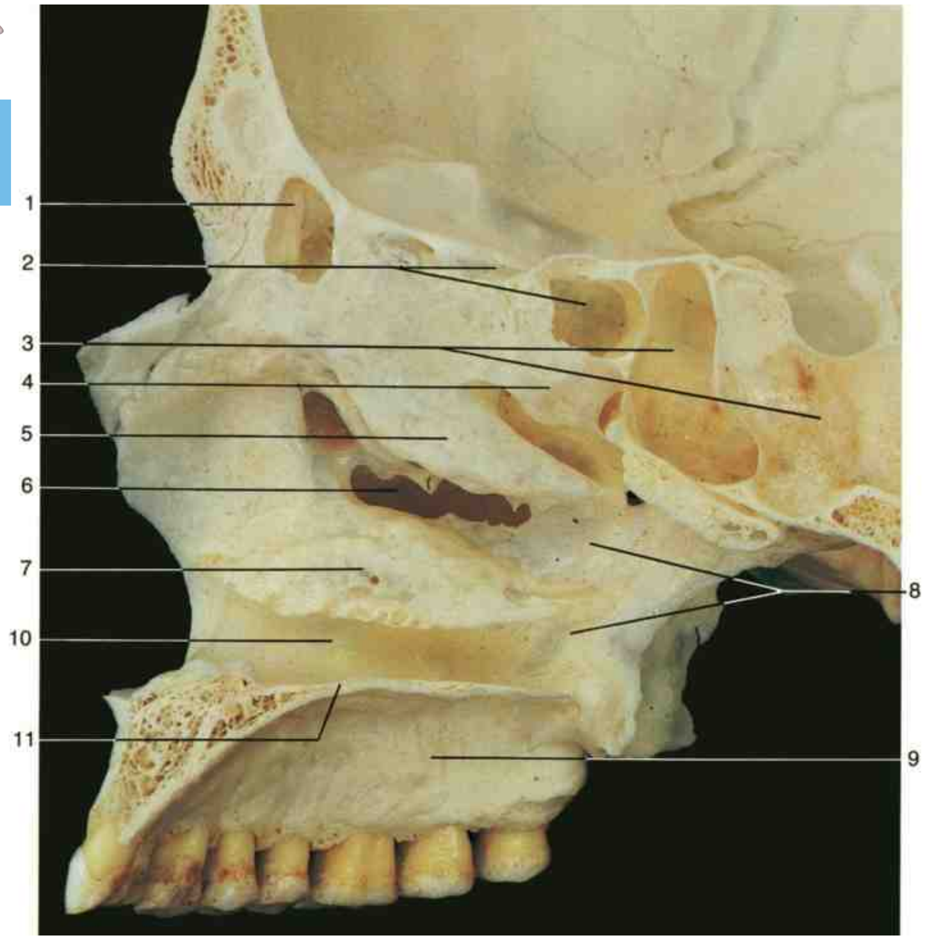
Left orbit (anterior aspect).



Left lacrimal bone (anterior aspect).



Left nasal bone (anterior aspect).



Lateral wall of the nasal cavity. Median section through the skull.

1 Frontal sinus
2 Ethmoidal air cells
3 Sphenoidal sinus
4 Superior nasal concha
5 Middle nasal concha
6 Maxillary hiatus
7 Inferior nasal concha
8 Palatine bone
9 Maxilla
10 Inferior meatus
11 Palatine process of the maxilla

▷

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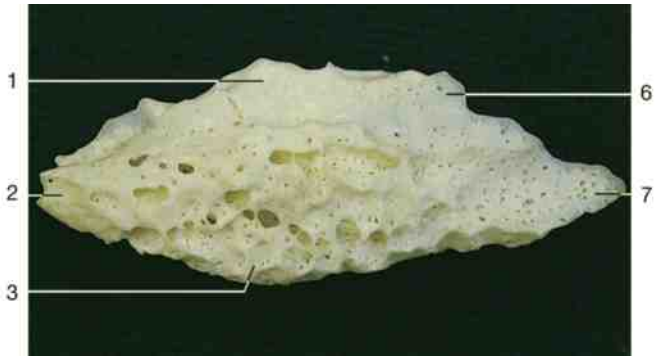
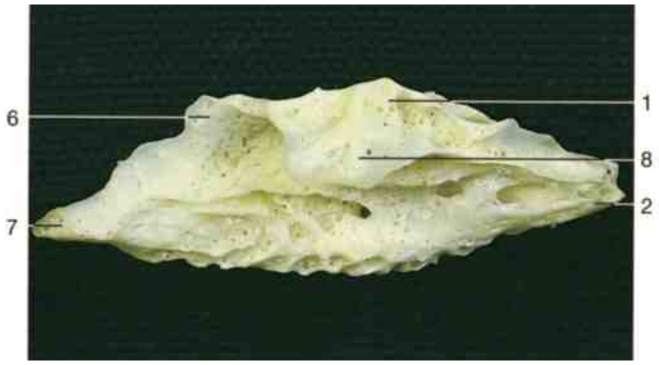
Blue = occipital bone
Light green = parietal bone
Yellow = frontal bone
Dark brown = temporal bone
Red = sphenoidal bone
Dark green = ethmoidal bone
Light blue = nasal bone
Pink = inferior concha
Orange = vomer
Violet = maxilla
White = palatine bone
White = mandible



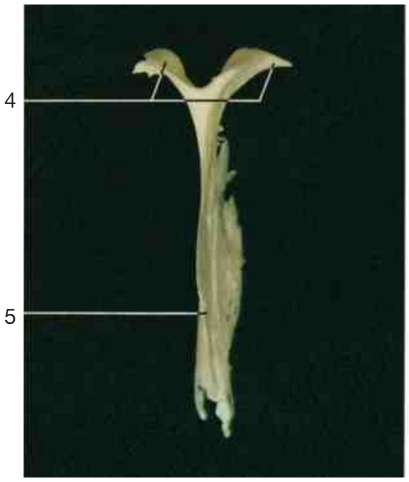
Right inferior nasal concha (medial aspect). Anterior part to the left.



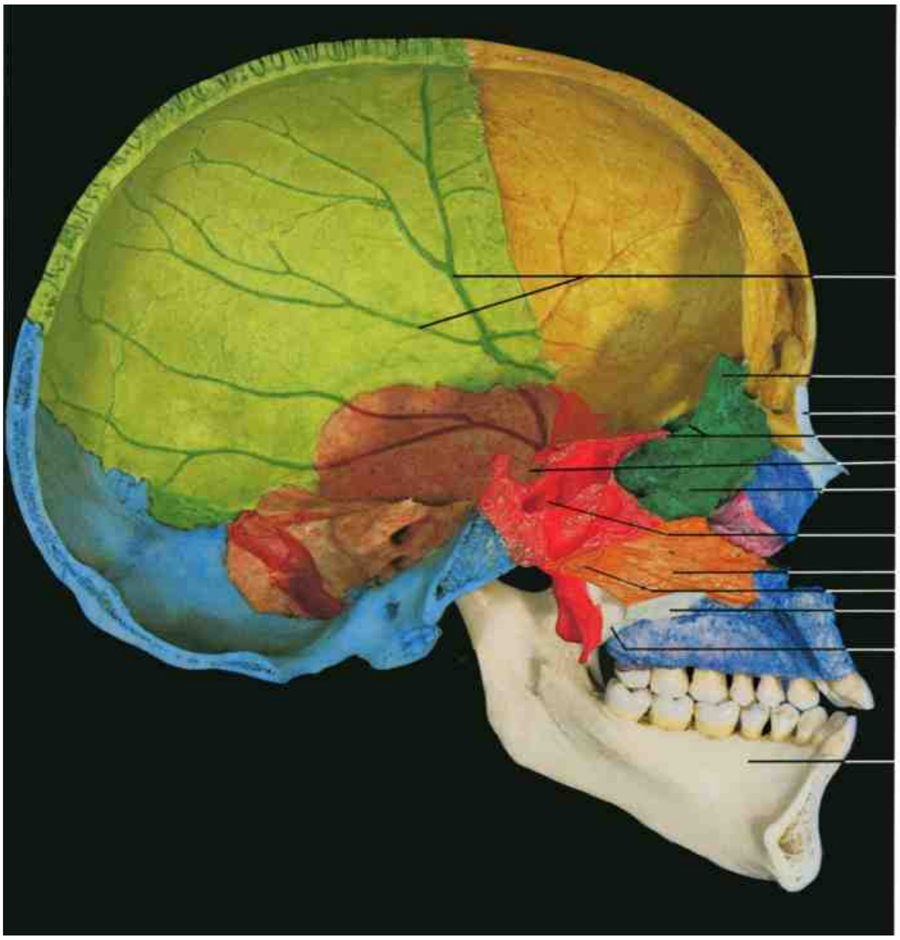
Right inferior nasal concha (lateral aspect). Anterior part to the right.

Inferior concha and vomer

1 Ethmoidal process
2 Anterior part of concha
3 Inferior border
4 Ala of vomer
5 Posterior border of nasal septum
6 Lacrimal process
7 Posterior part of concha
8 Maxillary process



Vomer (posterior aspect).

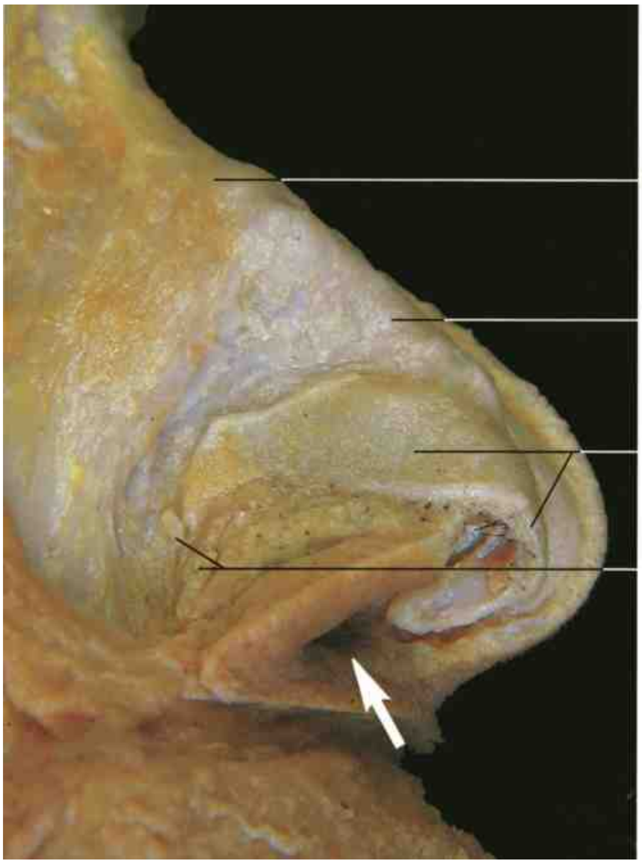


1 Crista galli
2 Cribriform plate of ethmoidal bone
3 Perpendicular plate of ethmoidal bone
4 Vomer
5 Ala of the vomer
6 Palatine bone (perpendicular process)
7 Palatine bone (horizontal plate)
8 Mandible
9 Nasal bone
10 Sphenoidal sinus
11 Hypophysial fossa (sella turcica)
12 Grooves for the middle meningeal artery

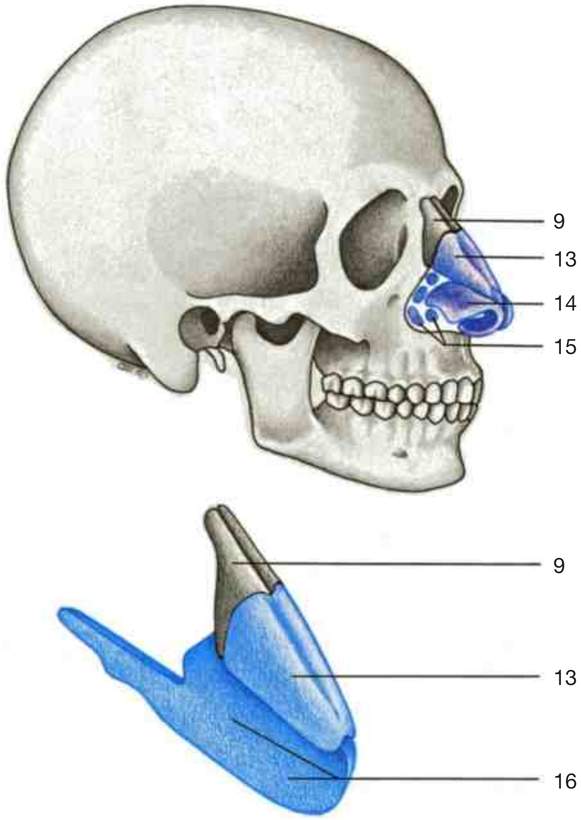
Cartilages of the nose

13 Lateral nasal cartilage
14 Greater alar cartilage
15 Lesser alar cartilages
16 Septal cartilage
17 Location of nasal bone

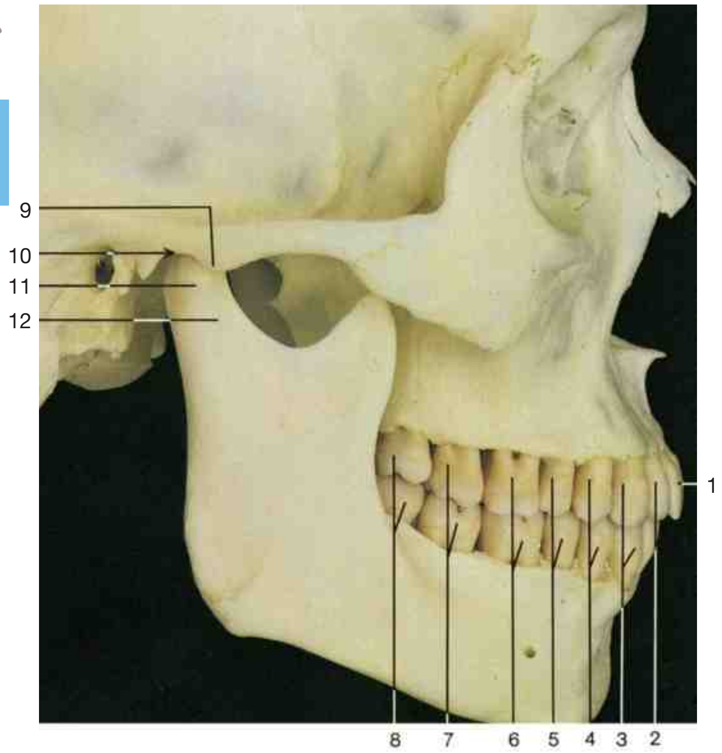
Paramedian sagittal section through the skull including the nasal septum.



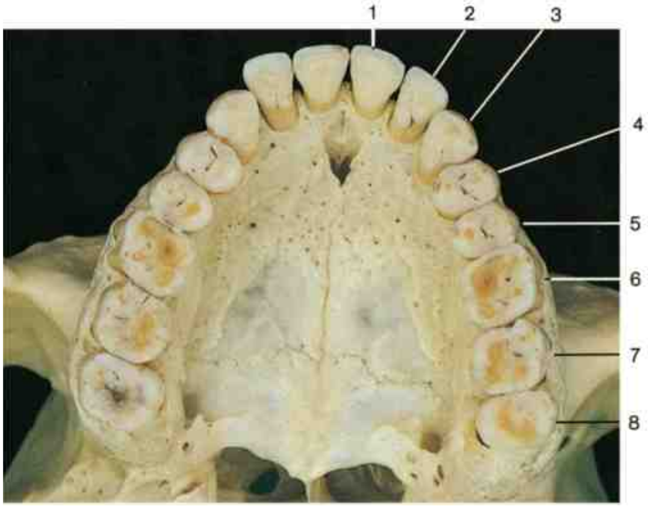
Cartilages of the nose (right anterior aspect). Arrow = nostril, framed by nasal wing.



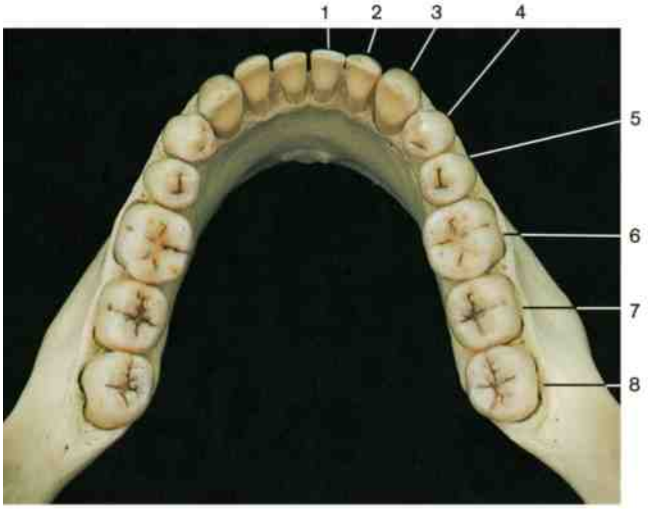
Cartilages of the nose
(schematic diagram of the external nose).



Normal position of teeth. Dentition in centric occlusion (lateral view).

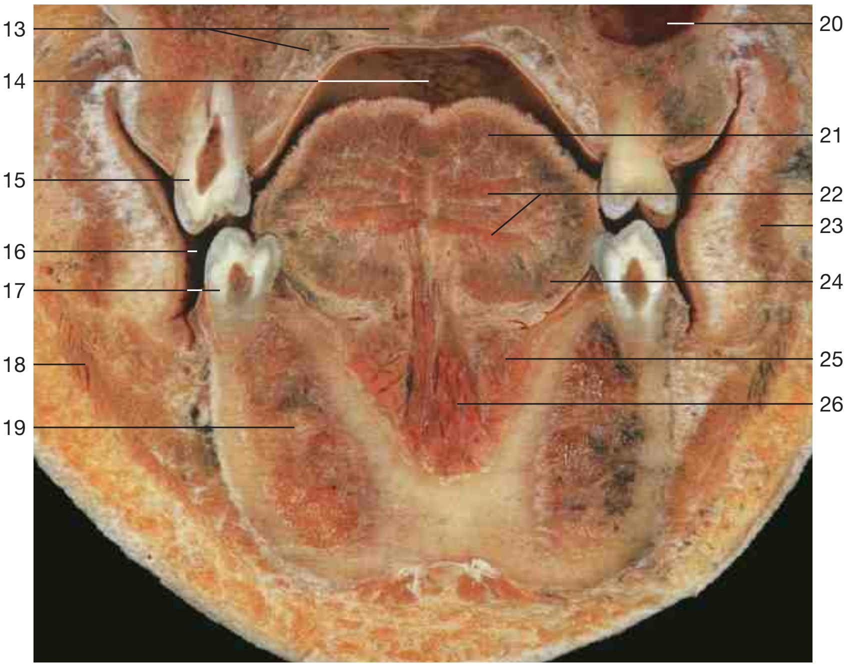


Upper teeth of the adult (inferior aspect).

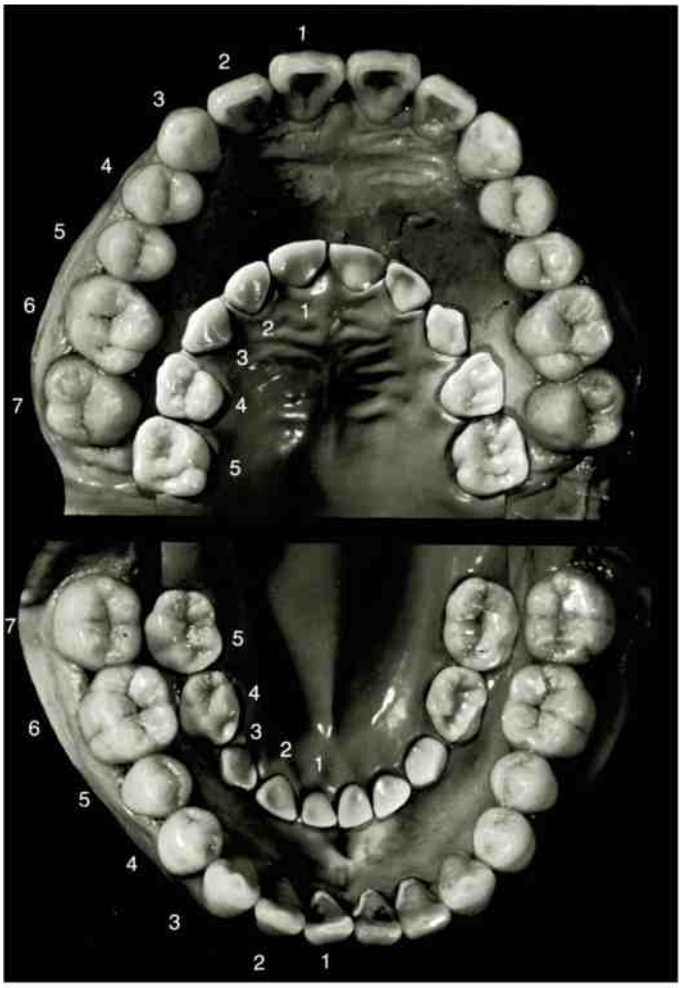


Lower teeth of the adult (superior aspect).

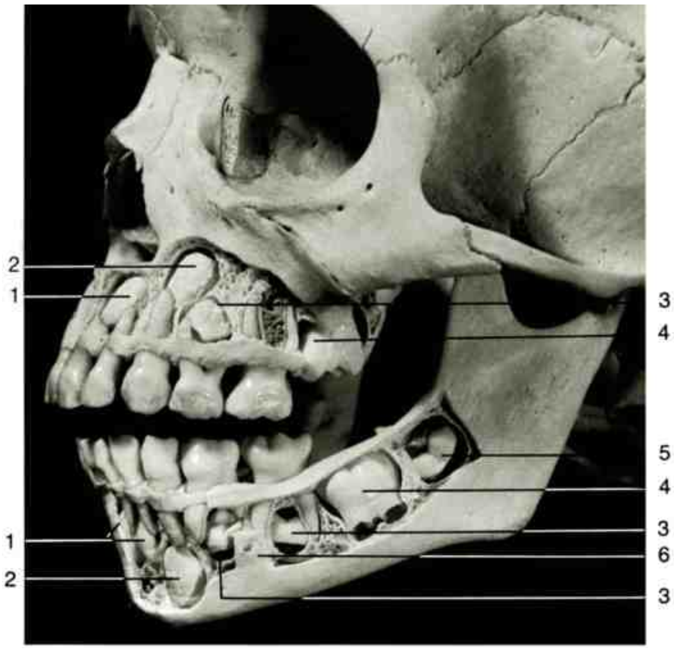
1	Central incisor
2	Lateral incisor
3	Canines
4	First premolars or bicuspids
5	Second premolars or bicuspids
6	First molars
7	Second molars
8	Third molars
9	Articular tubercle
10	Mandibular fossa
11	Head of mandible
12	Condylar process
13	Hard palate and palatine glands
14	Oral cavity
15	Upper molar
16	Oral vestibule
17	Lower molar
18	Platysma muscle
19	Mandible
20	Maxillary sinus
21	Superior longitudinal muscle of tongue
22	Transverse muscle of tongue
23	Buccinator muscle
24	Inferior longitudinal muscle of tongue
25	Sublingual gland
26	Genioglossus muscle



Coronal section through the oral cavity.

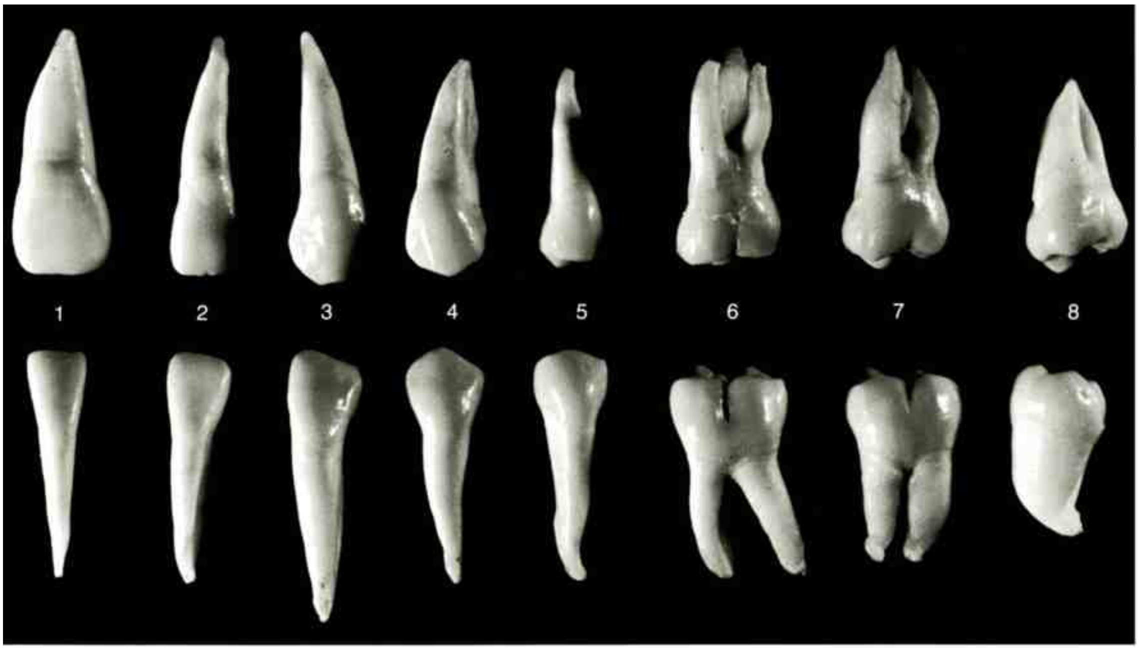


Comparison of the deciduous and permanent teeth.
Notice that the breadth of the alveolar arch of the child's mandible and maxilla holding the deciduous teeth is nearly the same as the comparable portion in the jaws of the adult. Note the emergence of the third molars. The numbers of the teeth correspond to the numbers in the figure below.

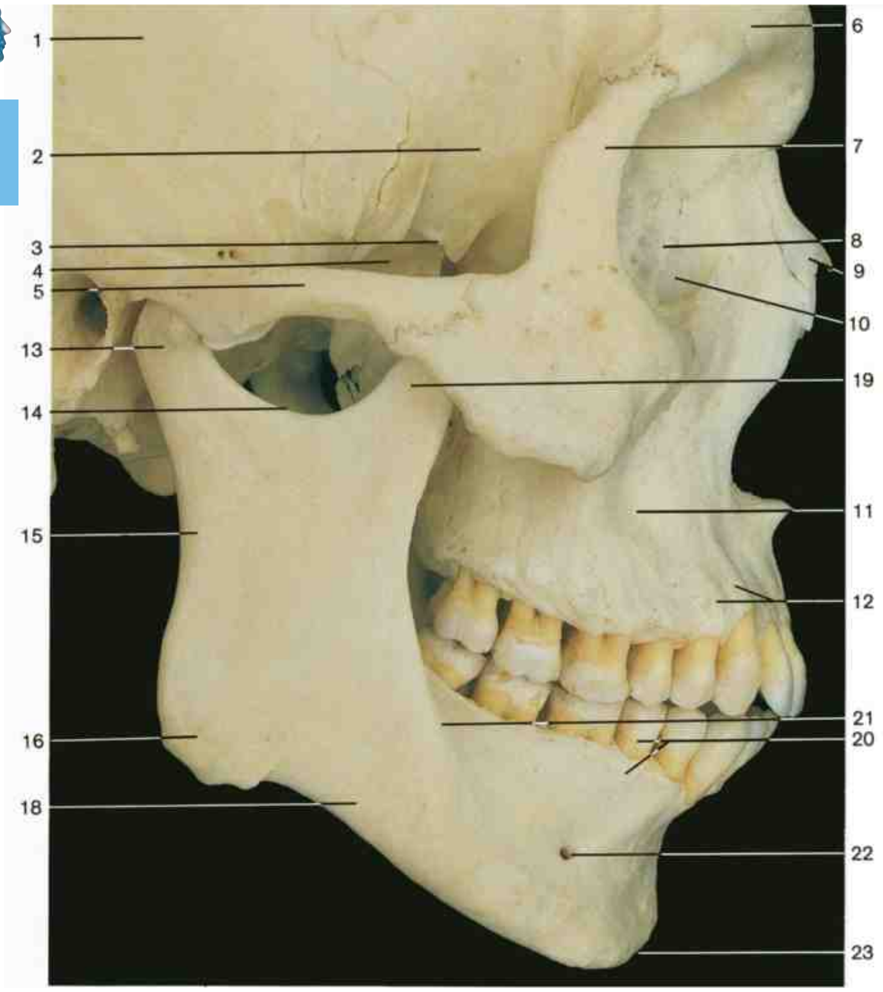


Deciduous teeth in child's skull. The developing crowns of the permanent teeth are displayed in their crypts in the maxilla and mandible.

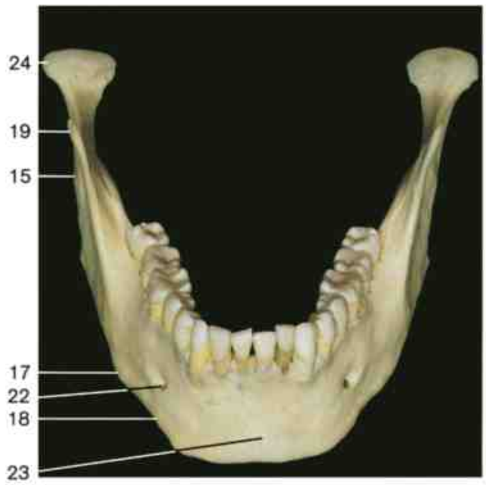
1	Permanent incisors
2	Permanent cuspid (canine)
3	Premolars
4	First permanent molar
5	Second permanent molar
6	Mental foramen



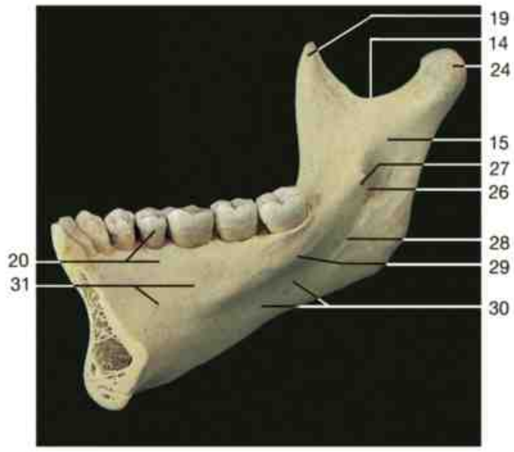
Isolated teeth of the alveolar part of the maxilla (top row) and the mandible (lower row), labial surface of the teeth.



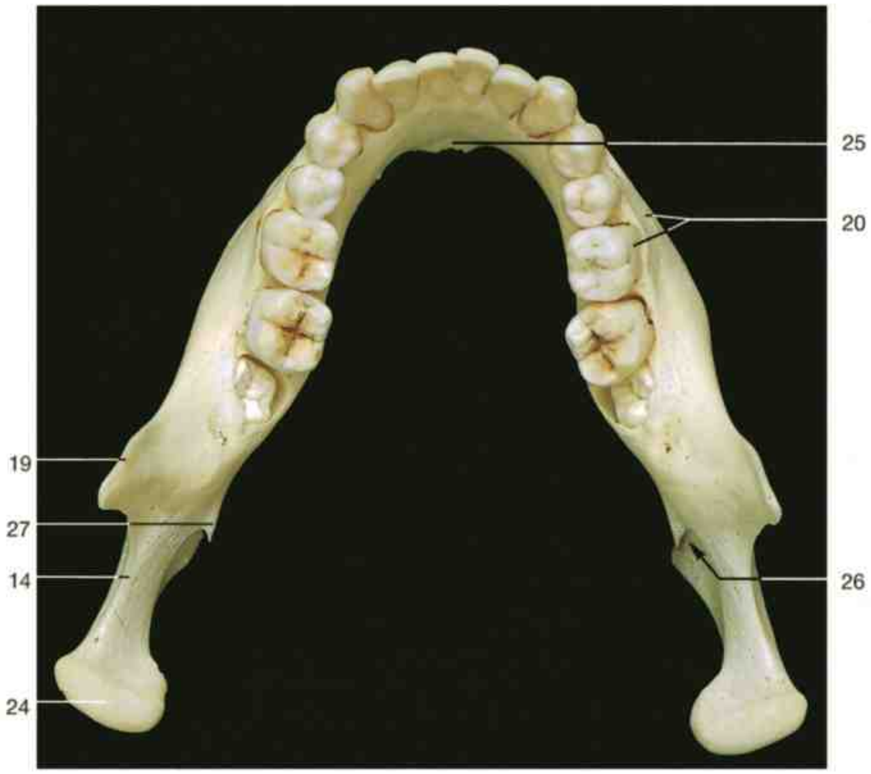
Lateral aspect of the facial bones. Mandible and teeth in the position of occlusion. Upper and lower jaw occluded.



Mandible of the adult (anterior aspect).



Right half of mandible (medial aspect).

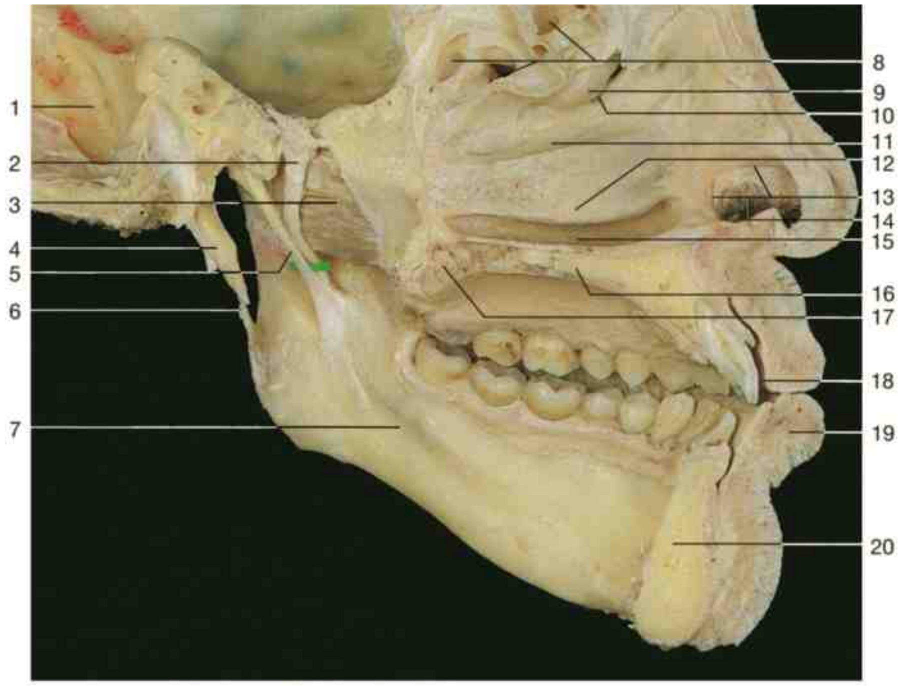


Mandible of the adult (superior aspect).

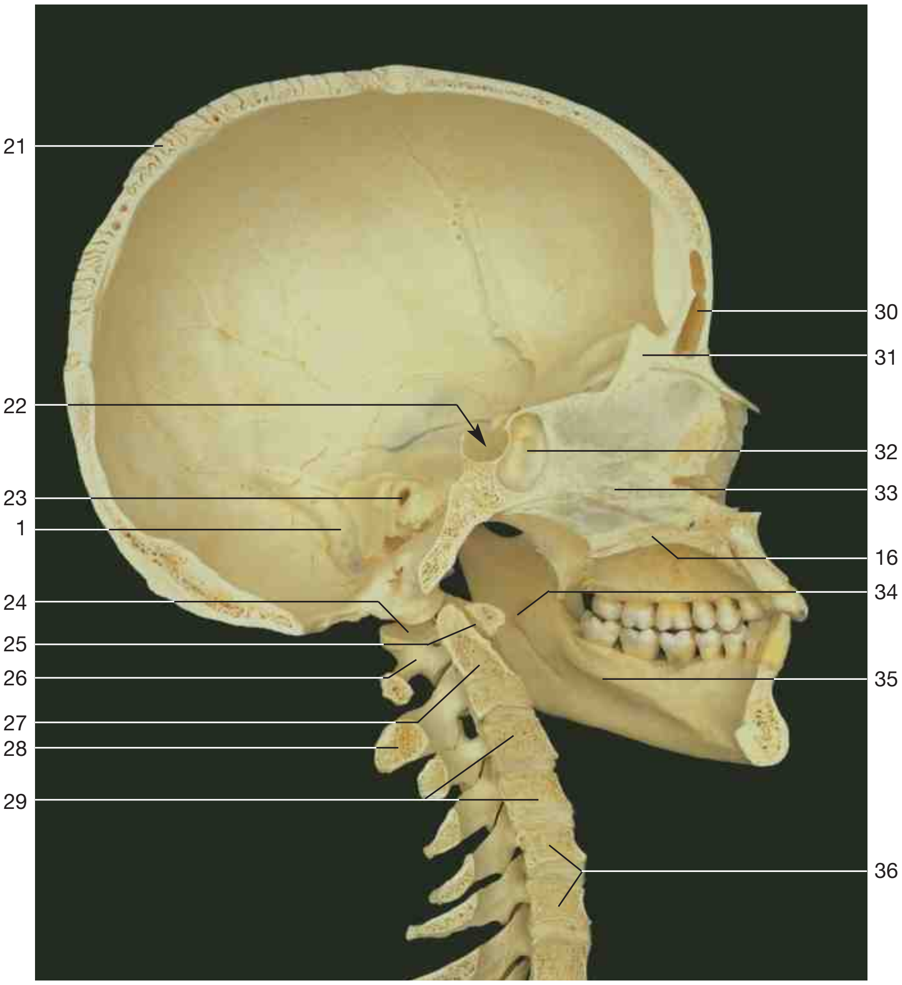
1 Temporal bone
2 Temporal fossa (greater wing of sphenoidal bone)
3 Infratemporal crest
4 Infratemporal fossa
5 Zygomatic arch
6 Frontal bone
7 Zygomatic bone (frontal process)
8 Lacrimal bone
9 Nasal bone
10 Lacrimal groove
11 Maxilla (canine fossa)
12 Alveolar process of maxilla

Mandible

13 Condylar process
14 Mandibular notch
15 Ramus of the mandible
16 Masseteric tuberosity
17 Angle of the mandible
18 Body of the mandible
19 Coronoid process
20 Alveolar process including teeth
21 Oblique line
22 Mental foramen
23 Mental protuberance
24 Head of the mandible
25 Genial tubercle or mental spine
26 Mandibular foramen (entrance to mandibular canal)
27 Lingula
28 Mylohyoid sulcus
29 Mylohyoid line
30 Submandibular fossa
31 Sublingual fossa

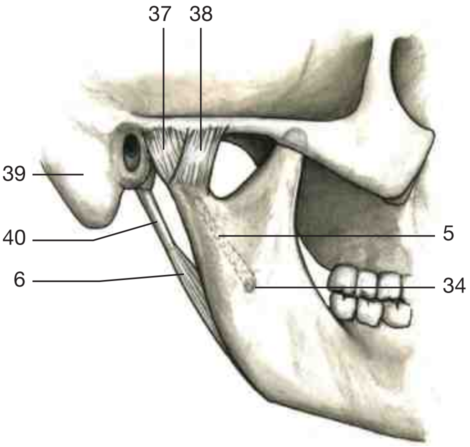


Ligaments of temporomandibular joint. Left half of the head (medial aspect).

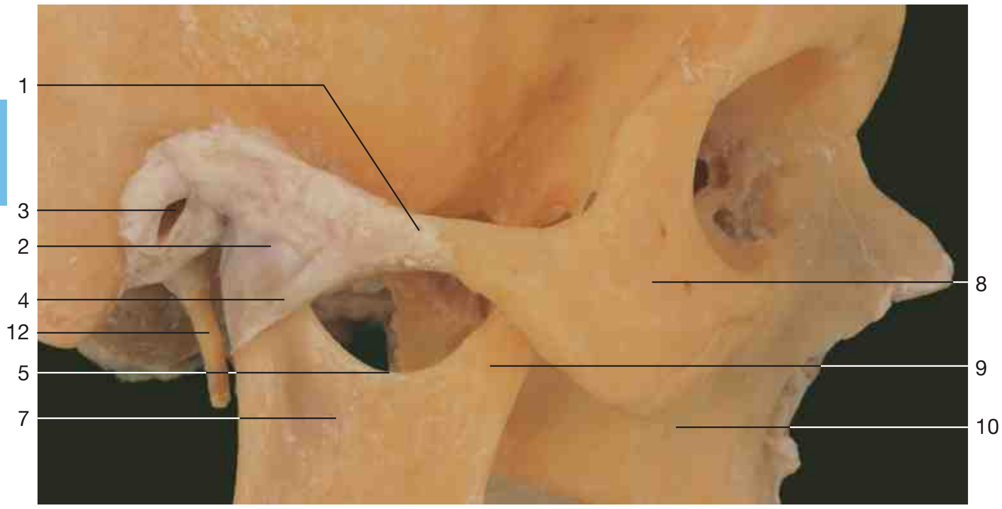


Head and cervical vertebral column (median section through skull and cervical vertebrae, medial aspect).

1 Groove for sigmoid sinus
2 Mandibular nerve
3 Lateral pterygoid muscle
4 Styloid process
5 Sphenomandibular ligament
6 Stylomandibular ligament
7 Mylohyoid groove
8 Ethmoidal air cells
9 Ethmoidal bulla
10 Hiatus semilunaris
11 Middle meatus
12 Inferior nasal concha
13 Limen nasi
14 Vestibule with hairs
15 Inferior meatus
16 Hard palate
17 Soft palate
18 Vestibule of oral cavity
19 Lower lip
20 Mandible
21 Calvaria with diploe
22 Sella turcica
23 Internal acoustic meatus
24 Atlanto-occipital articulation
25 Median atlanto-axial articulation
26 Atlas (C_1)
27 Dens of axis (C_2)
28 Spinous process of axis (C_2)
29 Cervical vertebrae (C_3, C_4)
30 Frontal sinus
31 Crista galli
32 Sphenoidal sinus
33 Nasal septum
34 Mandibular foramen
35 Mylohyoid line
36 Bodies of cervical vertebrae (C_5, C_6)
37 Articular capsule
38 Lateral ligament
39 Mastoid process
40 Styloid process

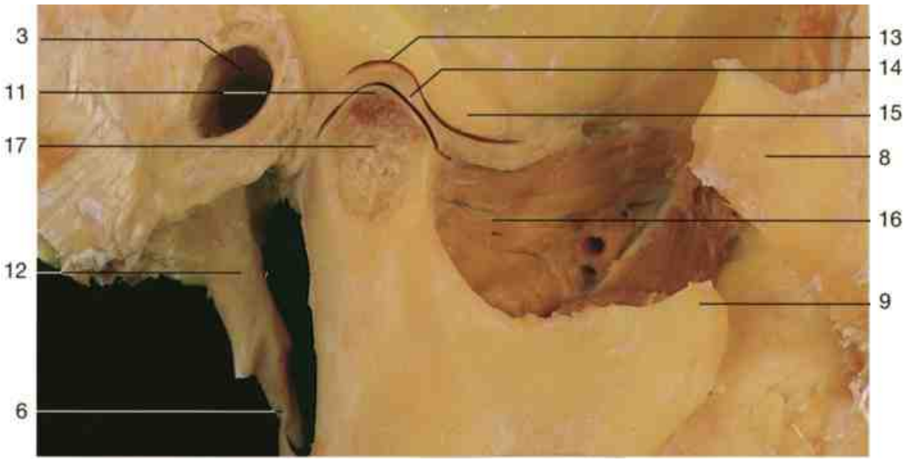


Ligaments related to the temporomandibular joint (schematic drawing).

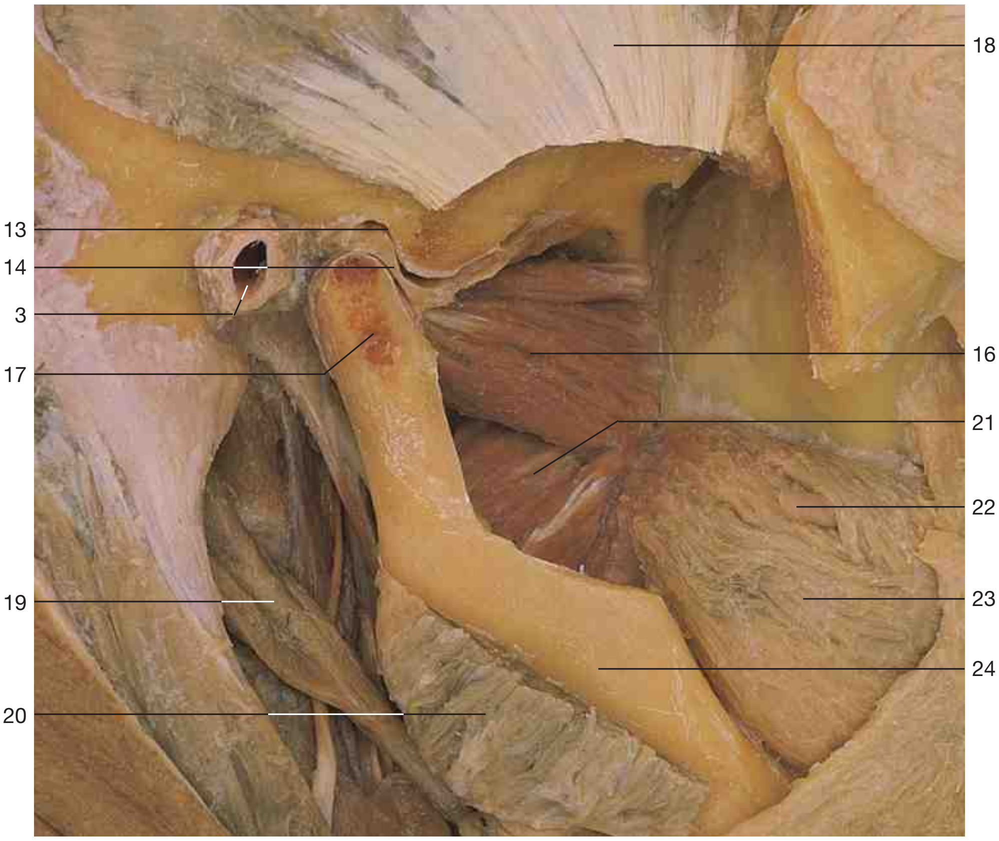


Temporomandibular joint with ligaments.

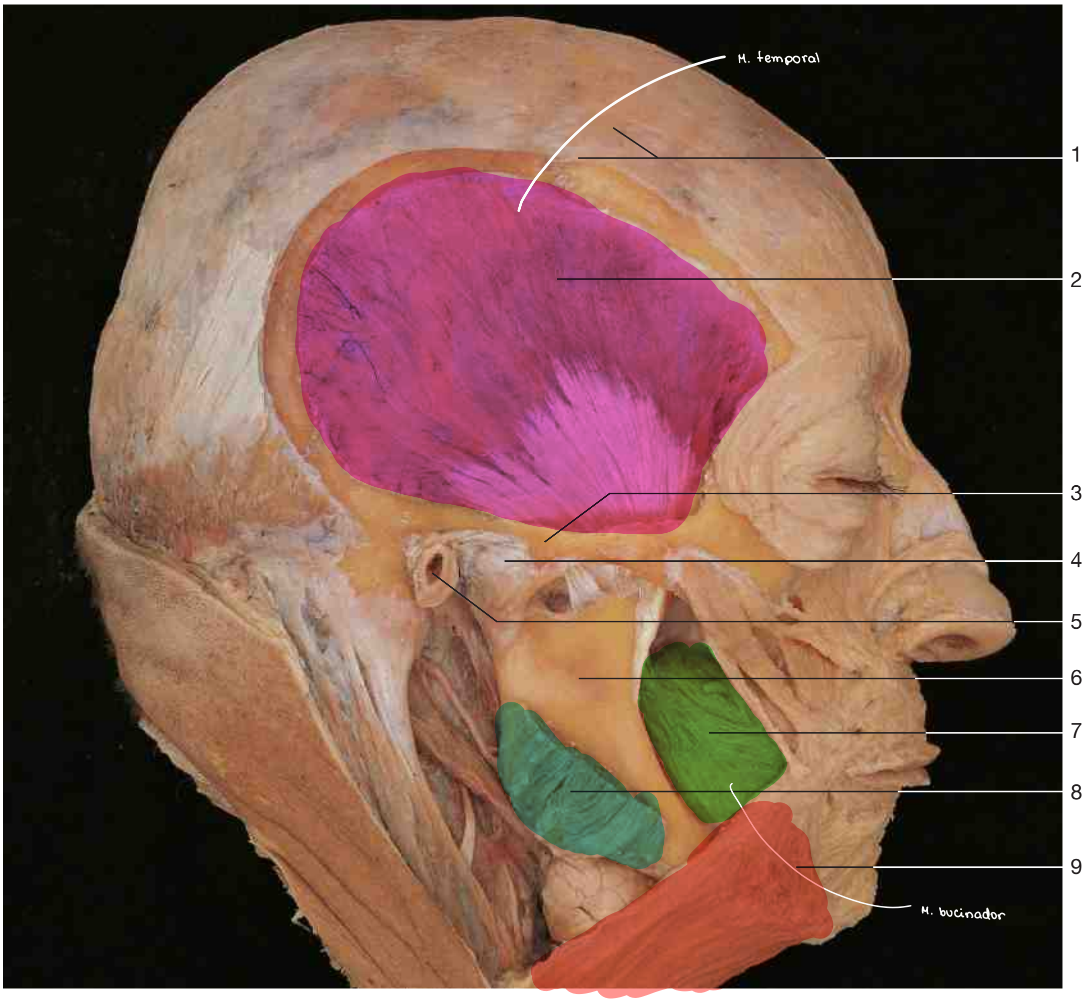
1	Zygomatic arch
2	Articular capsule
3	External acoustic meatus
4	Lateral ligament
5	Mandibular notch
6	Stylomandibular ligament
7	Ramus of the mandible
8	Zygomatic bone
9	Coronoid process
10	Maxilla
11	Articular cartilage of condylar process
12	Styloid process
13	Mandibular fossa
14	Articular disc
15	Articular tubercle
16	Lateral pterygoid muscle
17	Condylar process of mandible
18	Temporalis muscle
19	Digastric muscle, posterior belly
20	Masseter muscle
21	Medial pterygoid muscle
22	Parotid duct
23	Buccinator muscle
24	Mandible



Temporomandibular joint, sagittal section.

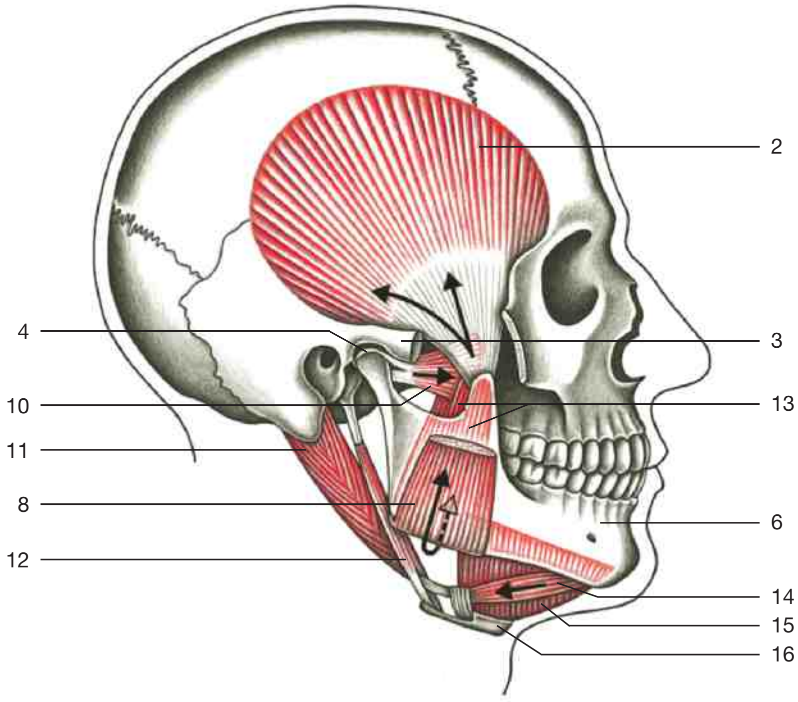


Temporomandibular joint. Dissection of the articular disc and the related muscles (lateral aspect).

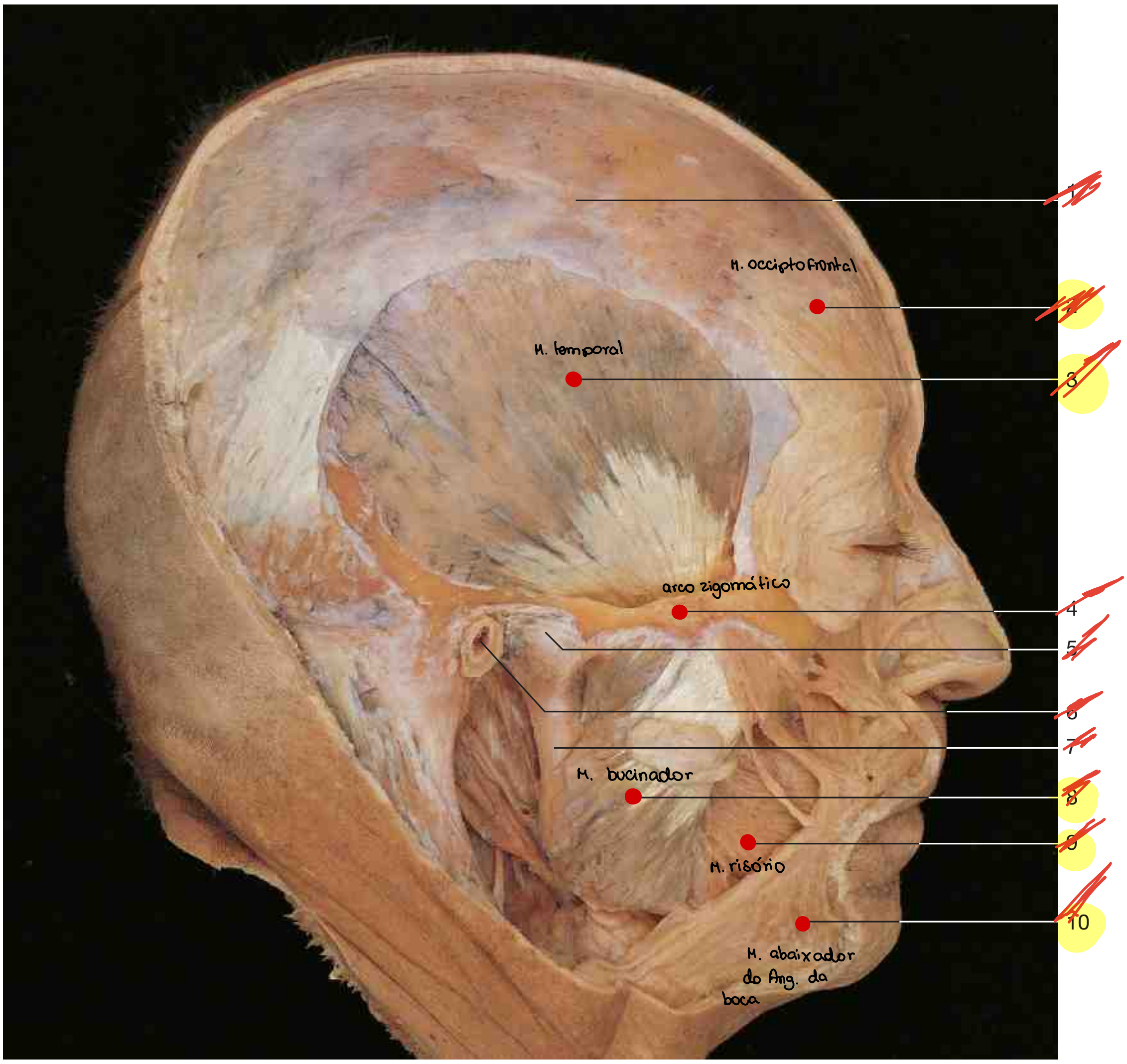


Muscles of mastication and temporomandibular joint. Masseter muscle partly removed.

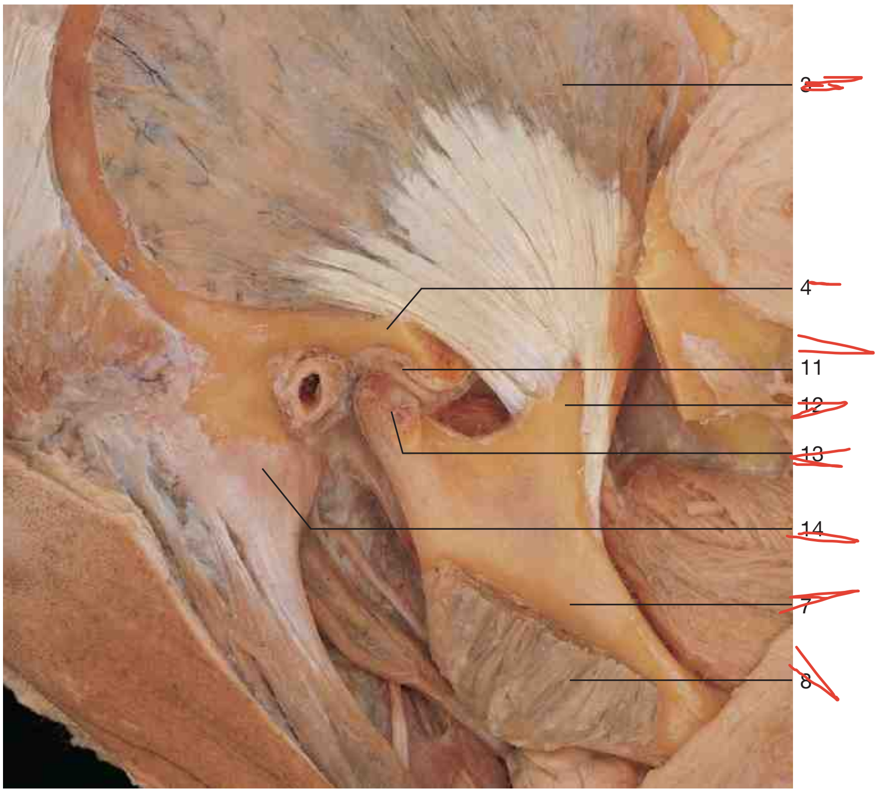
1	Galea aponeurotica
2	Temporalis muscle
3	Zygomatic arch
4	Temporomandibular joint
5	External acoustic meatus
6	Mandible
7	Buccinator muscle
8	Masseter muscle (cut)
9	Platysma muscle
10	Lateral pterygoid muscle
11	Posterior belly of digastric muscle
12	Stylohyoid muscle
13	Medial pterygoid muscle
14	Anterior belly of digastric muscle
15	Mylohyoid muscle
16	Hyoid bone



Effect of the masticatory muscles on the temporomandibular joint (arrows).

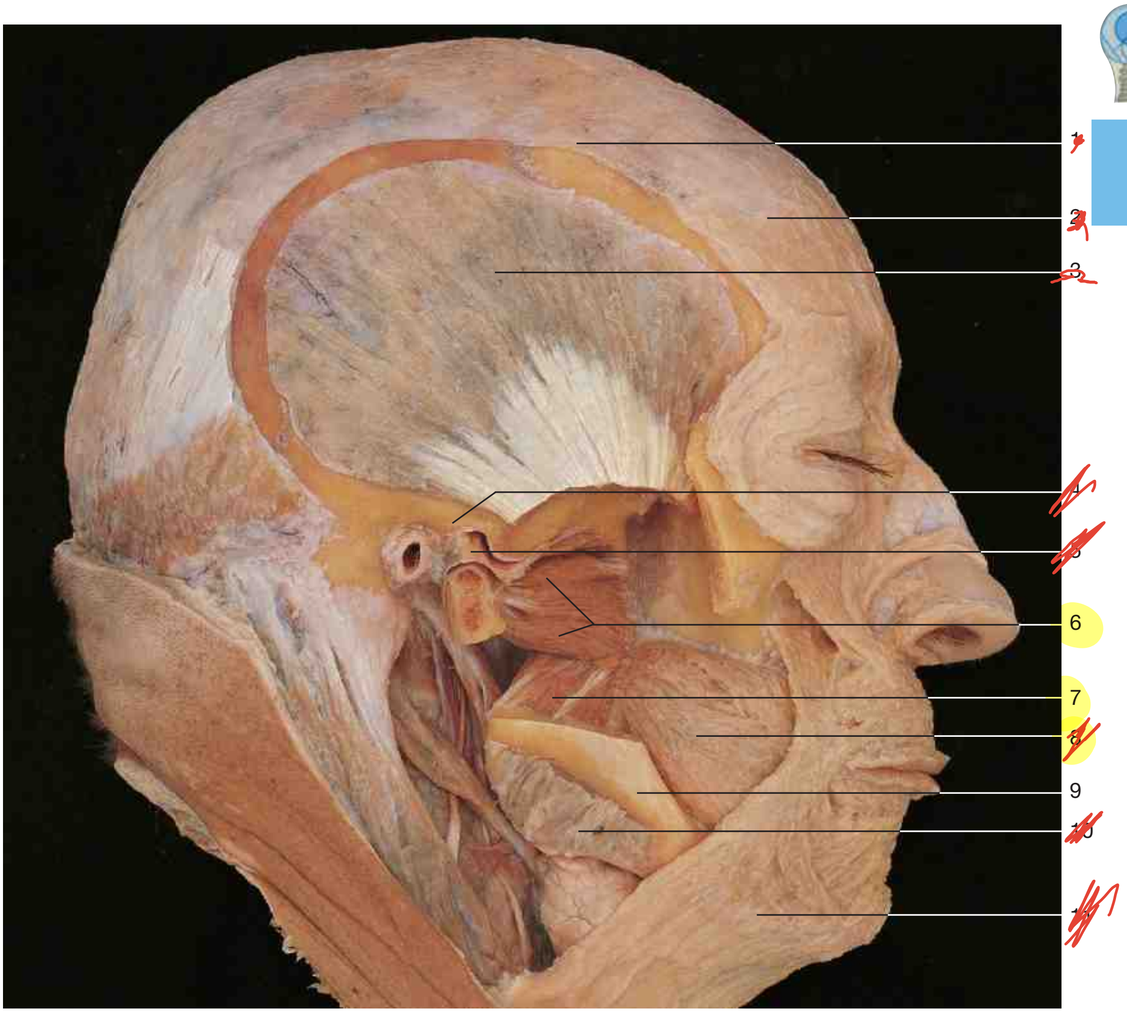

1
M. occiptofrontal
2
M. temporal
3
arco zigomático
4
5
6
7
M. bucinador
8
9
M. risório
10
M. abaixador do Ang. da boca

Muscles of mastication. The temporomandibular joint and the masseter and temporalis muscles are shown.


3
4
11
12
13
14
7
8

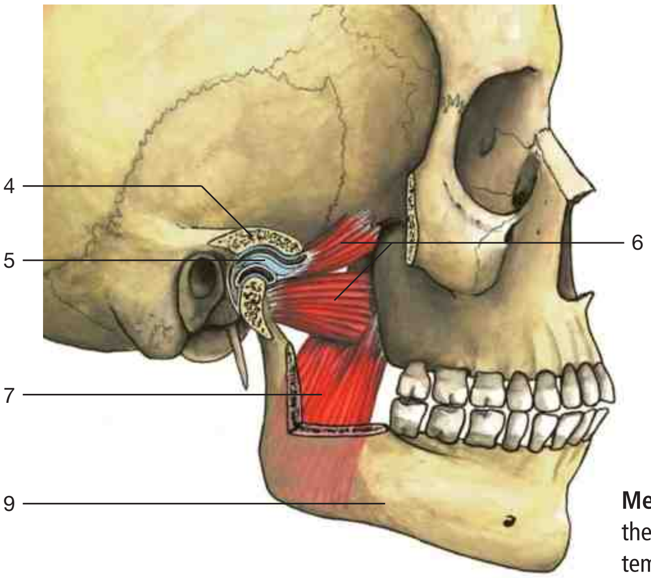
1	Galea aponeurotica
2	Frontal belly of occipitofrontalis muscle
3	Temporalis muscle
4	Zygomatic arch
5	Temporomandibular joint
6	External acoustic meatus
7	Mandible
8	Masseter muscle
9	Buccinator muscle
10	Platysma muscle
11	Articular disc of temporomandibular joint
12	Coronoid process of mandible
13	Condylar process of mandible
14	Mastoid process

Temporalis muscle with insertion at the mandible and the temporomandibular joint. Zygomatic arch and masseter muscle have been partly removed.

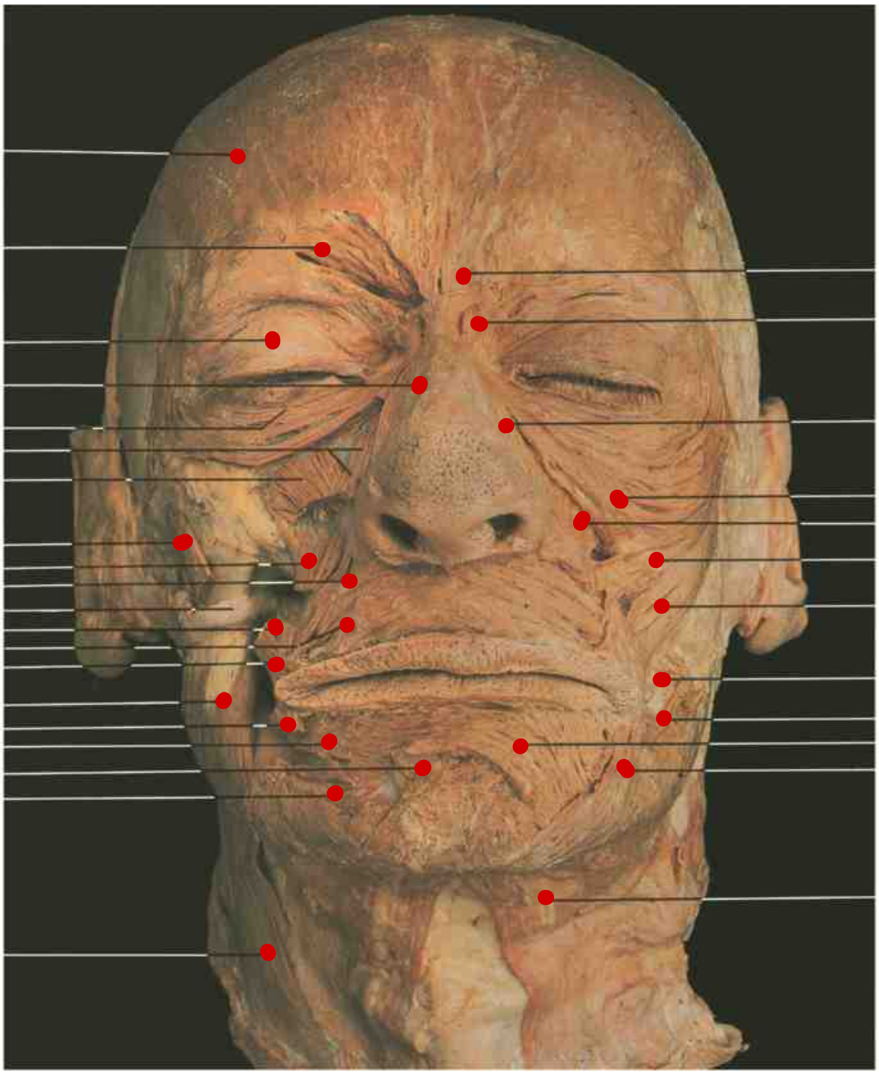


Muscles of mastication. The zygomatic arch and part of the mandible have been removed to reveal the medial and lateral pterygoid muscles.

1 Galea aponeurotica
2 Frontal belly of occipitofrontalis muscle
3 Temporalis muscle
4 Zygomatic arch
5 Articular disc of temporomandibular joint
6 Lateral pterygoid muscle
7 Medial pterygoid muscle
8 Buccinator muscle
9 Mandible
10 Masseter muscle
11 Platysma muscle

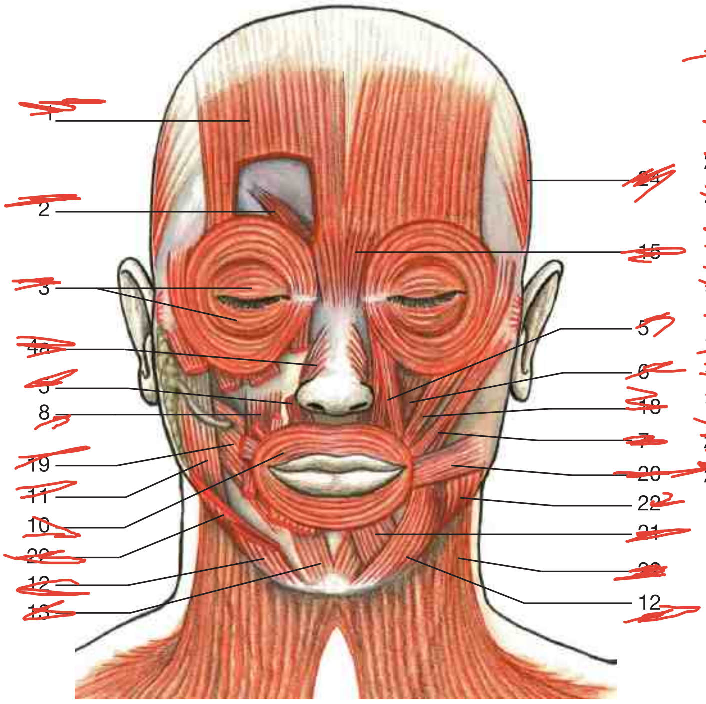


Medial and lateral pterygoid muscles and their connections with the articular disc of the temporomandibular joint (schematic drawing).


1
2
3
4 a
3
5
6
7
8
4 b
9
8
10
7
11
12
10
13
21
14
15
16
5
17
6
18
7
19
20
21
12
22

1 Frontal belly of occipitofrontalis muscle
2 Corrugator supercilii muscle
3 Palpebral part of orbicularis oculi muscle
4 a Transverse part of nasalis muscle
4 b Alar part of nasalis muscle
5 Levator labii superioris alaeque nasi muscle
6 Levator labii superioris muscle
7 Zygomaticus major muscle
8 Levator anguli oris muscle
9 Parotid duct
10 Orbicularis oris muscle
11 Masseter muscle
12 Depressor anguli oris muscle
13 Mentalis muscle
14 Sternocleidomastoid muscle
15 Procerus muscle
16 Depressor supercilii muscle
17 Orbital part of orbicularis oculi muscle
18 Zygomaticus minor muscle
19 Buccinator muscle
20 Risorius muscle
21 Depressor labii inferioris muscle
22 Platysma muscle
23 Galea aponeurotica
24 Temporoparietalis muscle
25 Occipital belly of occipitofrontalis muscle
26 Parotid gland with fascia
27 Temporal fascia
28 Orbicularis oculi muscle
29 Parotid duct and masseter muscle

Facial muscles (anterior aspect). Left side: superficial layer, right side: deeper layer.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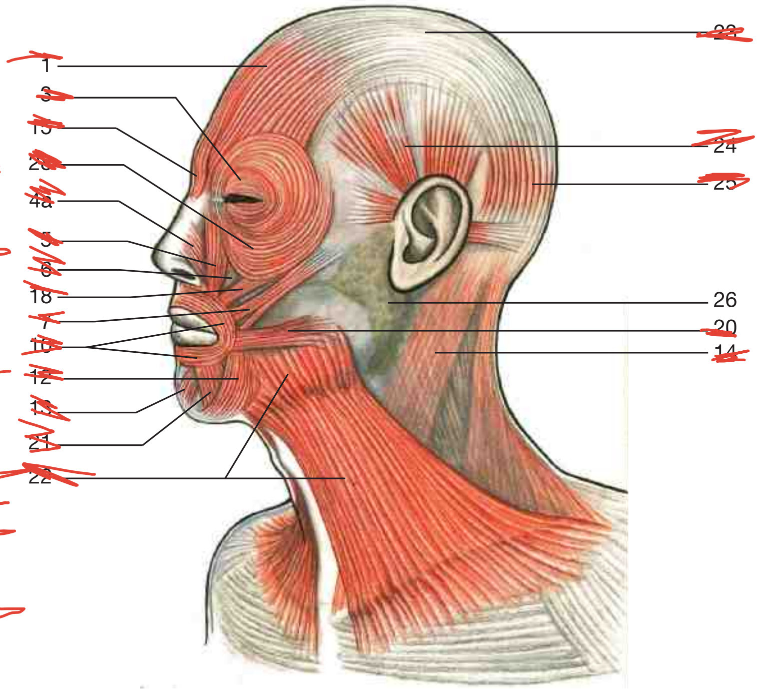
Facial muscles (schematic drawing).
Left side: superficial layer, right side: deeper layer.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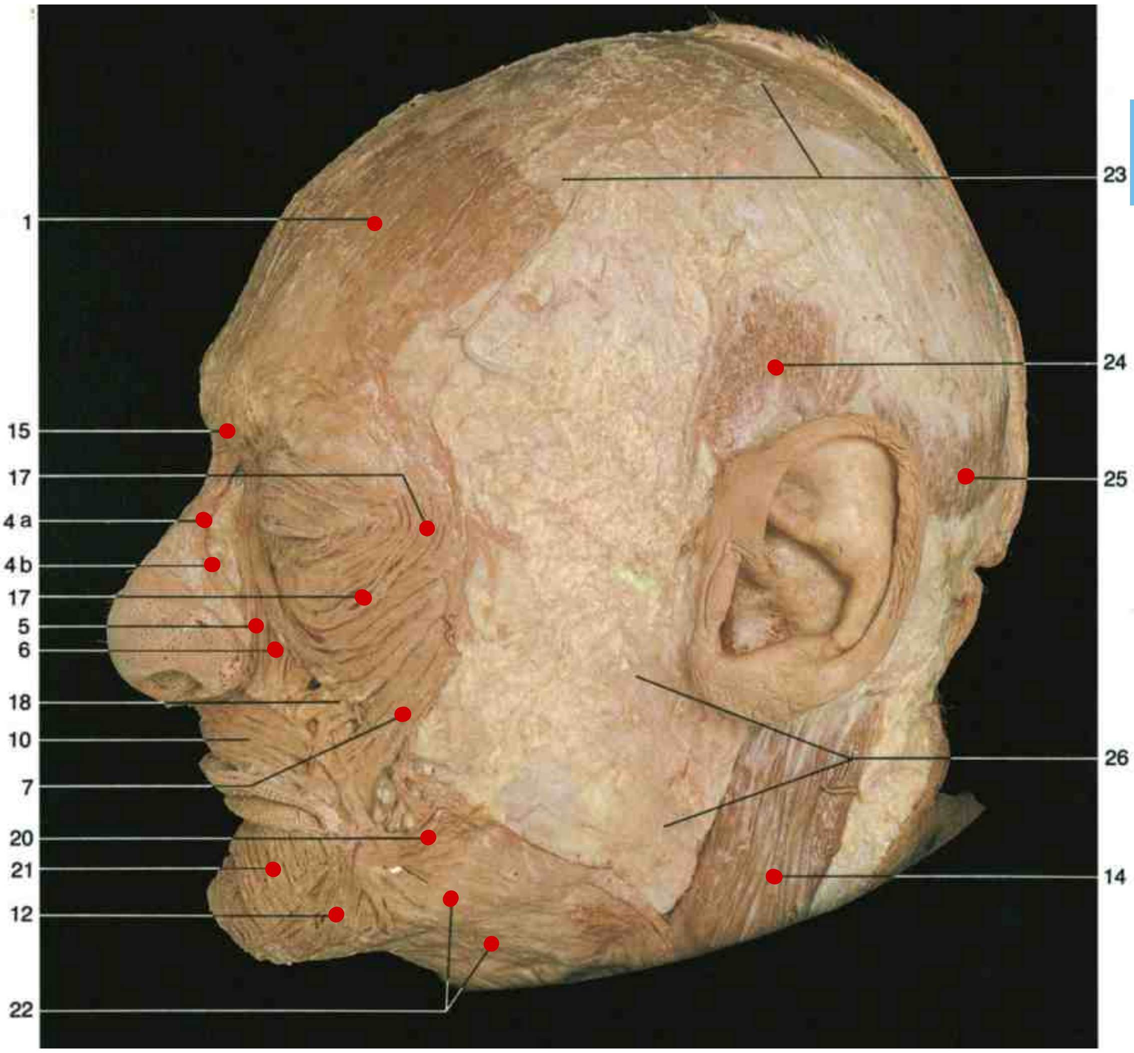
Facial muscles (schematic drawing). Sphincter-like muscles surround the orifices of the head. Radially arranged muscles work as their antagonists.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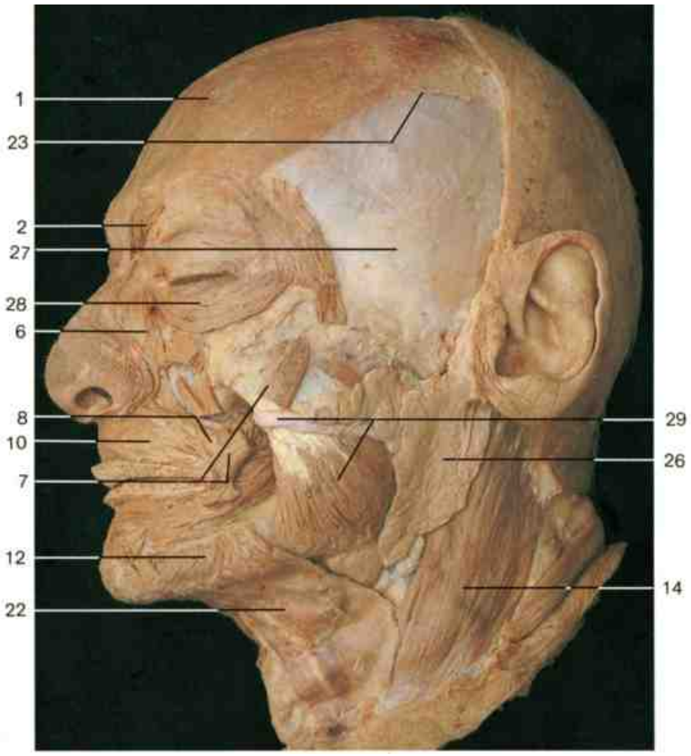
Facial muscles (lateral aspect).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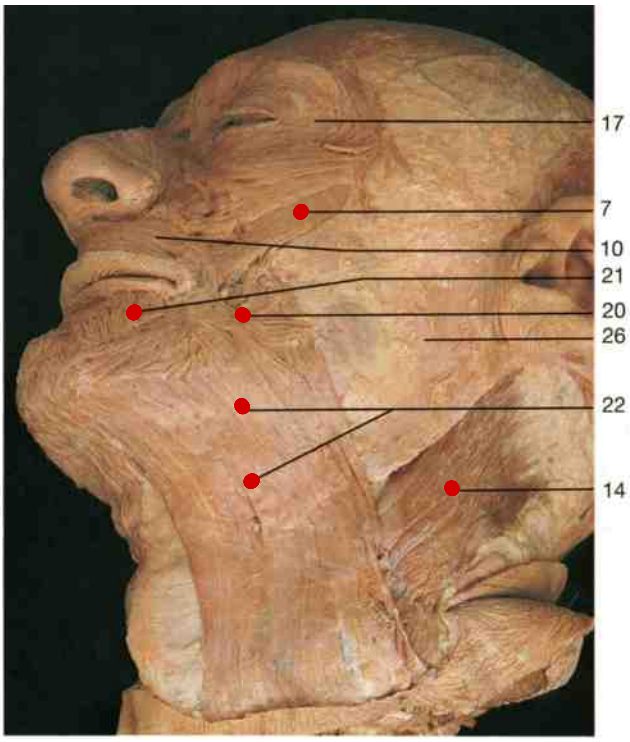
Facial muscles and parotid gland (lateral aspect).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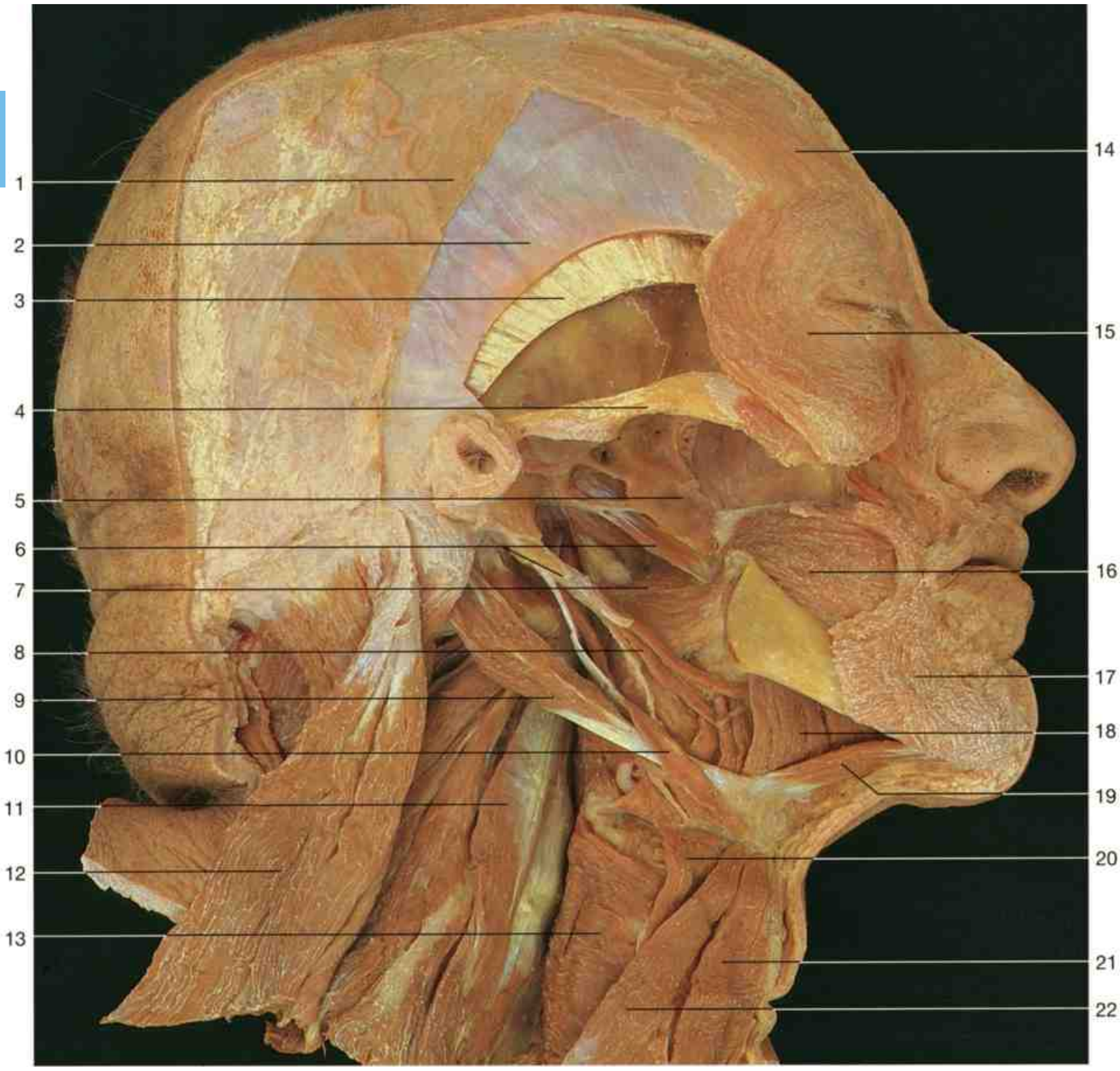
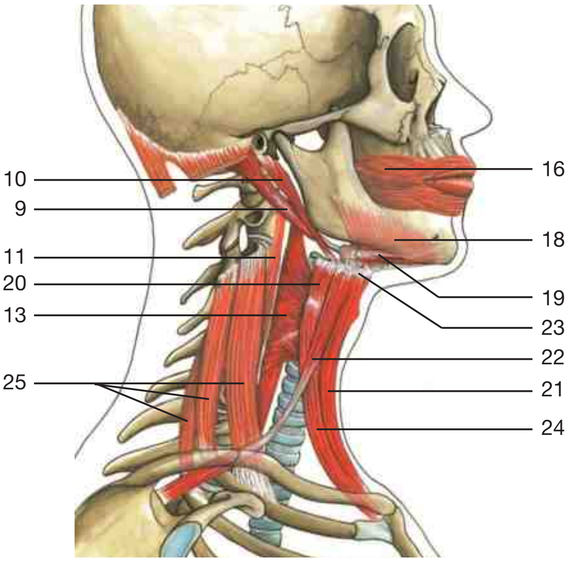
Platysma muscle (oblique lateral aspect). Superficial lamina of cervical fascia partly removed.

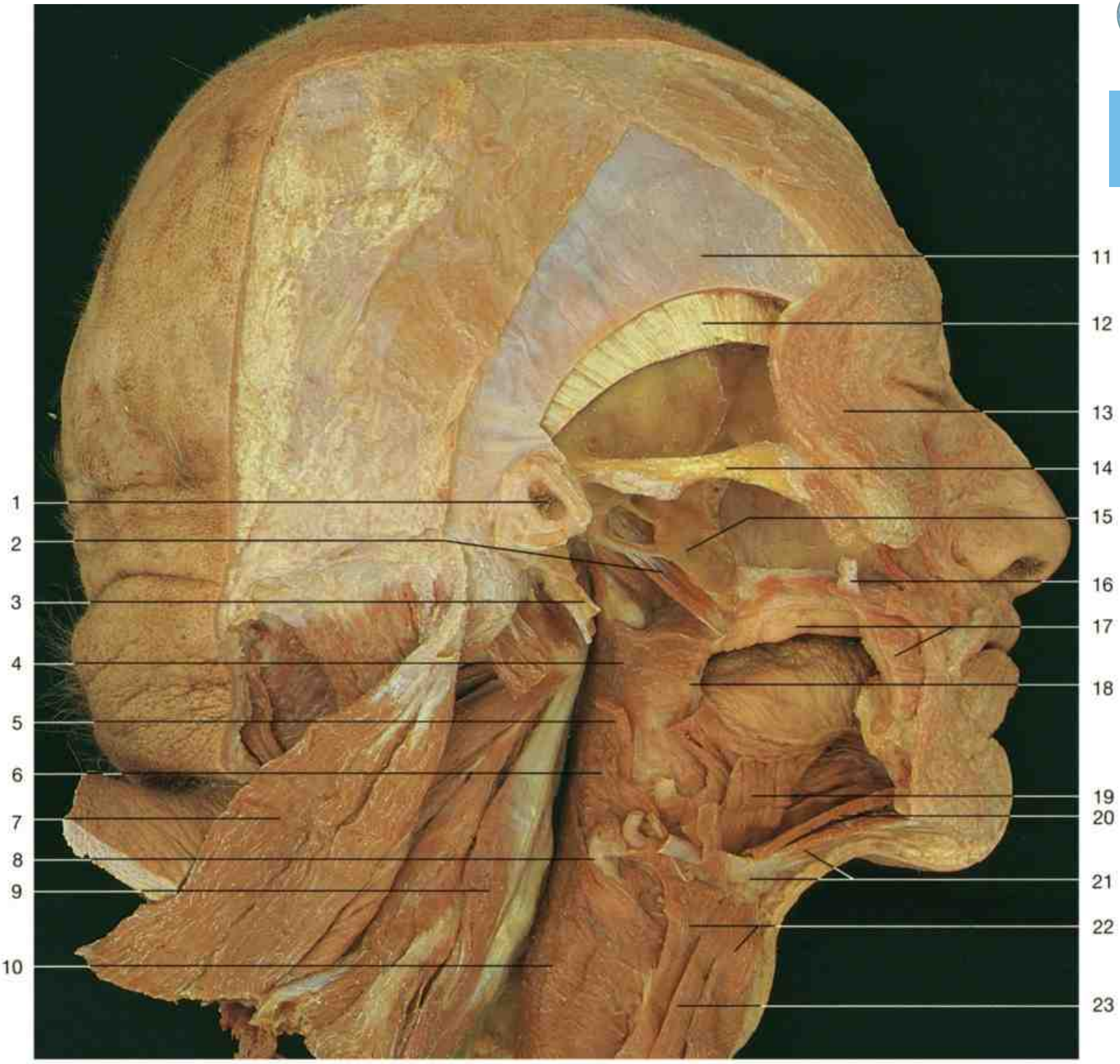


Supra- and infrahyoid muscles and pharynx (lateral aspect). Ramus of mandible, pterygoid muscles, and insertion of temporalis muscle removed.



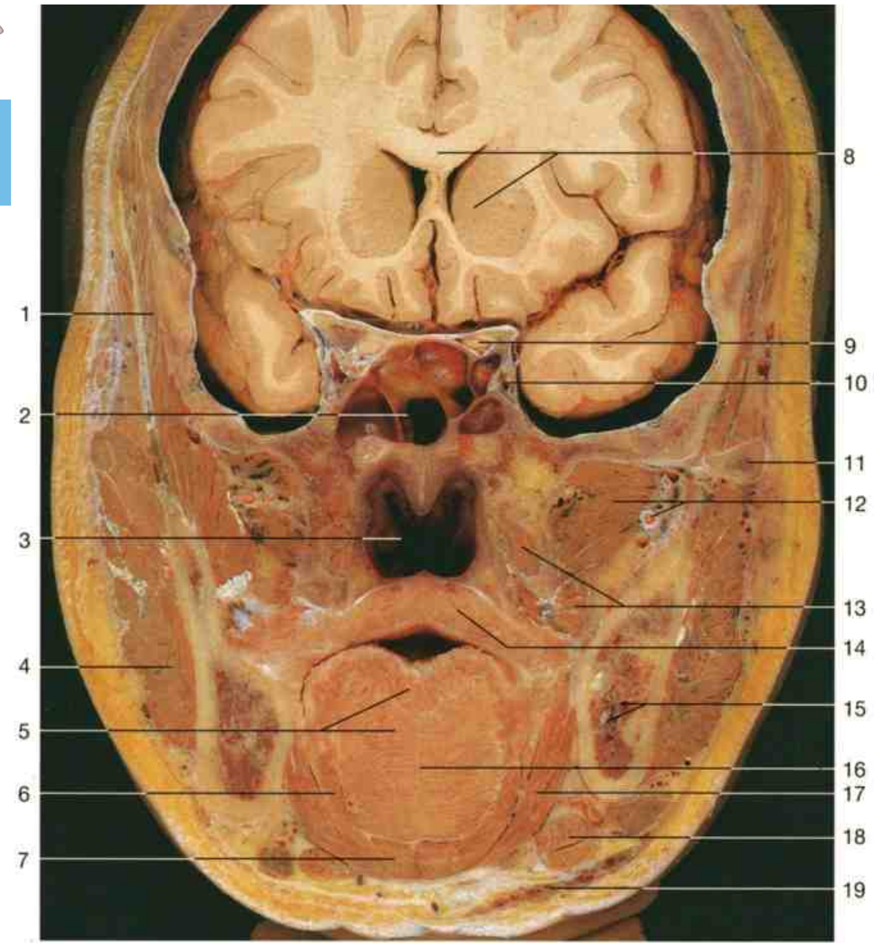
Supra- and infrahyoid muscles (schematic drawing).

1 Galea aponeurotica
2 Temporal fascia
3 Tendon of temporalis muscle
4 Zygomatic arch
5 Lateral pterygoid plate
6 Tensor veli palatini muscle (styloid process)
7 Superior constrictor muscle of pharynx
8 Styloglossus muscle
9 Posterior belly of digastric muscle
10 Stylohyoid muscle
11 Longus capitis muscle
12 Sternocleidomastoid muscle (reflected)
13 Inferior constrictor of pharynx
14 Frontal belly of occipitofrontalis muscle
15 Orbital part of orbicularis oculi muscle
16 Buccinator muscle
17 Depressor anguli oris muscle
18 Mylohyoid muscle
19 Anterior belly of digastric muscle
20 Thyrohyoid muscle
21 Sternohyoid muscle
22 Omohyoid muscle
23 Hyoid bone
24 Sternothyroid muscle
25 Scalenus muscles

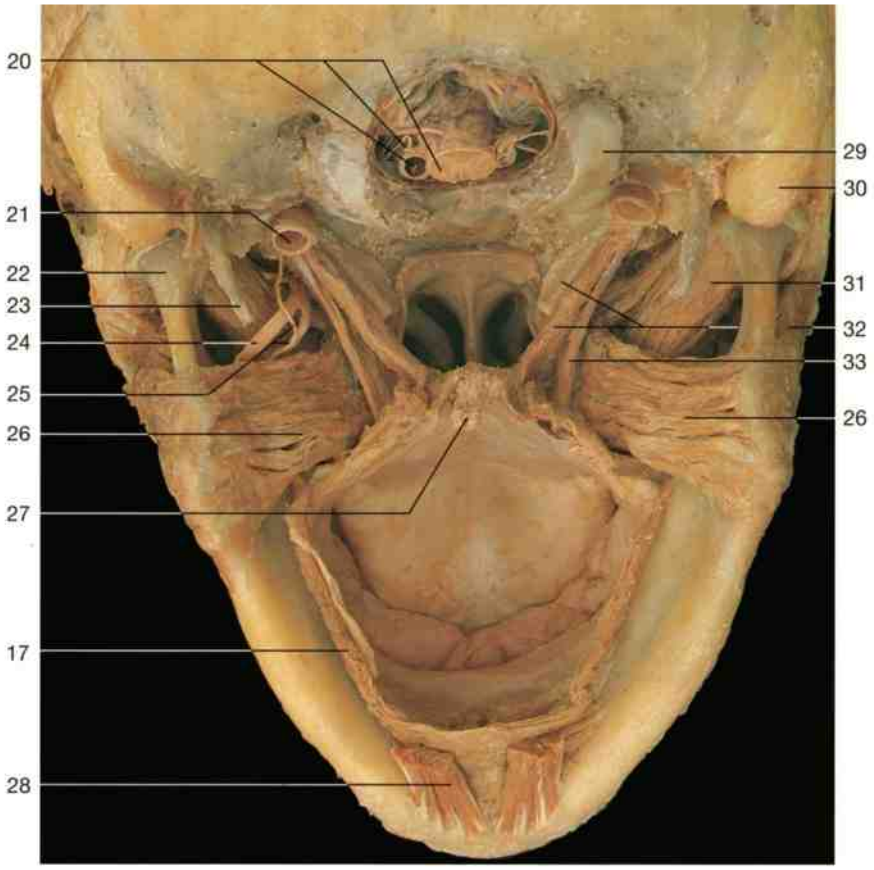


Supra- and infrahyoid muscles and pharynx (lateral aspect). Buccinator muscle removed; oral cavity opened.

1	External acoustic meatus
2	Tensor veli palatini muscle
3	Styloid process
4	Superior constrictor muscle of pharynx
5	Stylopharyngeus muscle (divided)
6	Middle constrictor muscle of pharynx
7	Sternocleidomastoid muscle
8	Greater horn of hyoid bone
9	Longus capitis muscle
10	Inferior constrictor muscle of pharynx
11	Temporal fascia
12	Tendon of temporalis muscle
13	Orbicularis oculi muscle
14	Zygomatic arch
15	Lateral pterygoid plate
16	Parotid duct
17	Gingiva of upper jaw (without teeth), buccinator muscle (divided)
18	Pterygomandibular raphe
19	Hyoglossus muscle
20	Mylohyoid muscle
21	Anterior belly of digastric muscle (hyoid bone)
22	Sternohyoid and thyrohyoid muscles
23	Omohyoid muscle

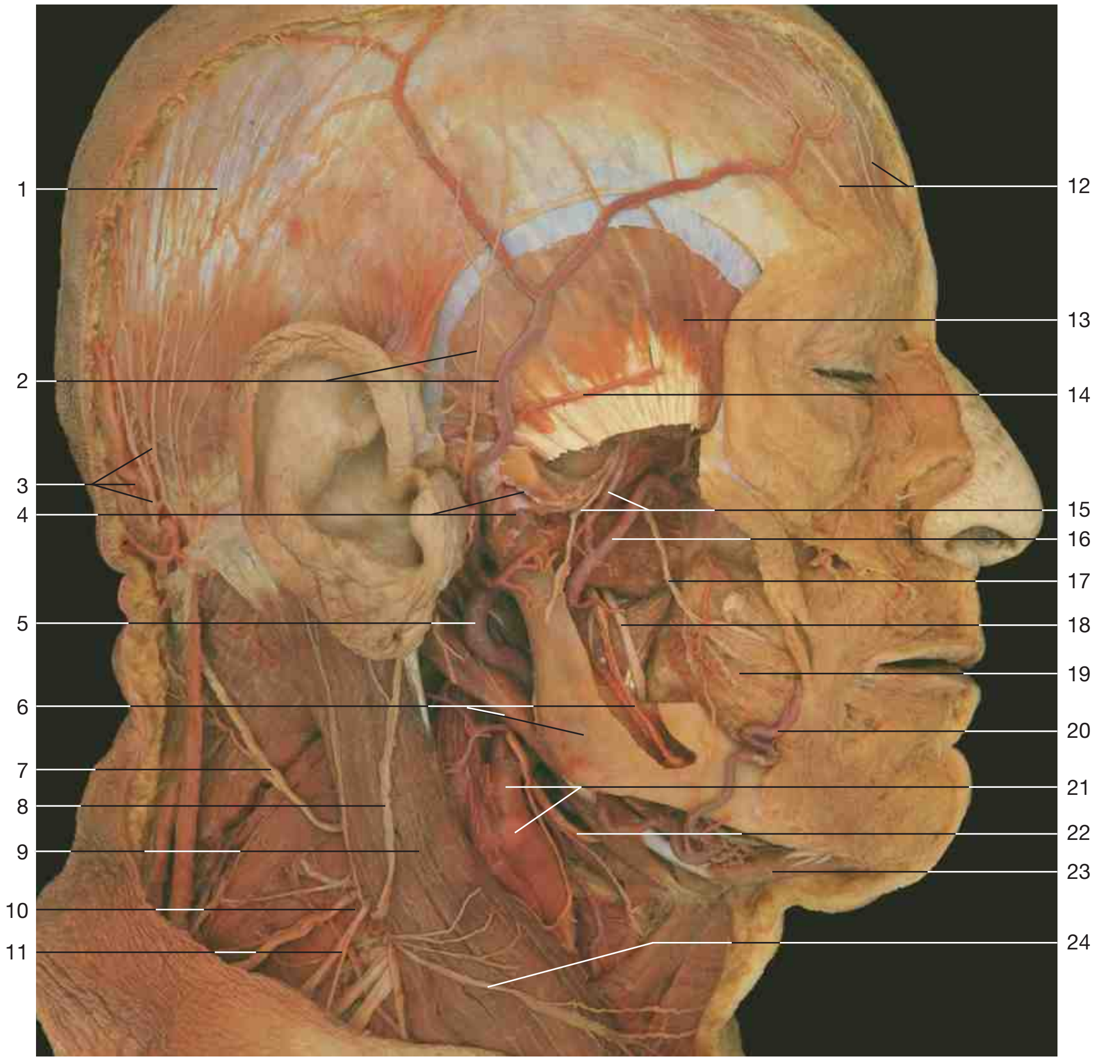


Coronal section through cranial, nasal, and oral cavities at the level of sphenoidal sinus.



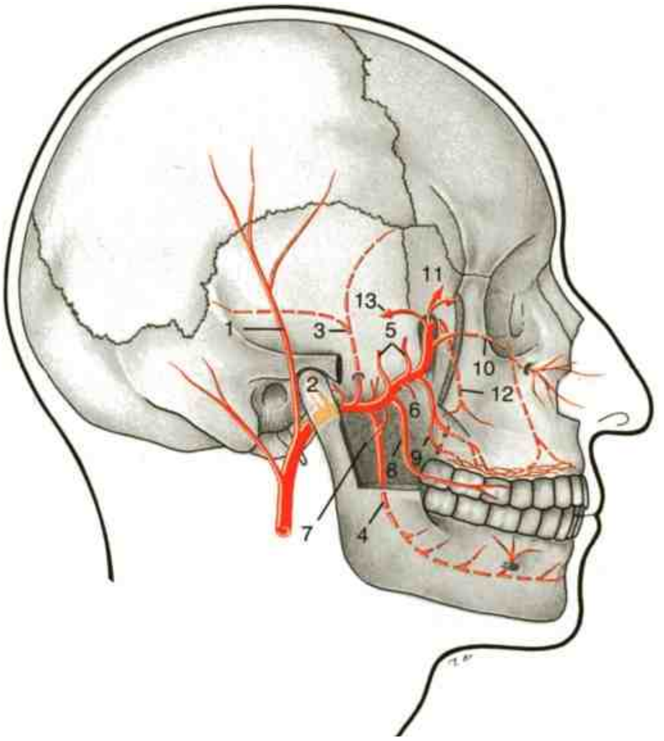
Pterygoid and palatine muscles (posterior aspect).

1 Temporalis muscle
2 Sphenoidal sinus
3 Nasopharynx
4 Masseter muscle
5 Superior longitudinal, transverse and vertical muscles of tongue
6 Hyoglossus muscle
7 Geniohyoid muscle
8 Corpus callosum (caudate nucleus)
9 Optic nerve
10 Cavernous sinus
11 Zygomatic arch
12 Cross section of lateral pterygoid muscle and maxillary artery
13 Section of medial pterygoid muscle
14 Soft palate
15 Mandible and inferior alveolar nerve
16 Septum of the tongue
17 Mylohyoid muscle
18 Submandibular gland
19 Platysma muscle
20 Foramen magnum, vertebral artery and spinal cord
21 Internal carotid artery
22 Head of mandible
23 Styloid process
24 Inferior alveolar nerve
25 Lingual nerve and chorda tympani nerve
26 Medial pterygoid muscle
27 Uvula
28 Anterior belly of digastric muscle (cut)
29 Condyle of occipital bone
30 Mastoid process
31 Lateral pterygoid muscle
32 Auditory tube and levator veli palatini muscle
33 Tensor veli palatini muscle



Dissection of maxillary artery (lateral aspect). Ramus mandibulae partly removed and canalis mandibulae opened.

1 Galea aponeurotica
2 Superficial temporal artery and auriculotemporal nerve
3 Occipital artery and greater occipital nerve (C_2)
4 Temporomandibular joint (opened)
5 External carotid artery
6 Mandible and inferior mandibular artery and nerve
7 Accessory nerve (Var.)
8 Great auricular nerve
9 Sternocleidomastoideus muscle
10 Punctum nervosum
11 Supraclavicular nerves
12 Supra-orbital nerves
13 Temporalis muscle
14 Transverse facial artery
15 Masseteric nerve and deep temporal branch of maxillary artery
16 Maxillary artery
17 Buccal nerve
18 Lingual nerve
19 Buccinator muscle
20 Facial artery
21 External carotid artery and sinus caroticus
22 Hypoglossal nerve
23 Digastric muscle
24 Transverse cervical nerves



Main branches of maxillary artery (schematic drawing).

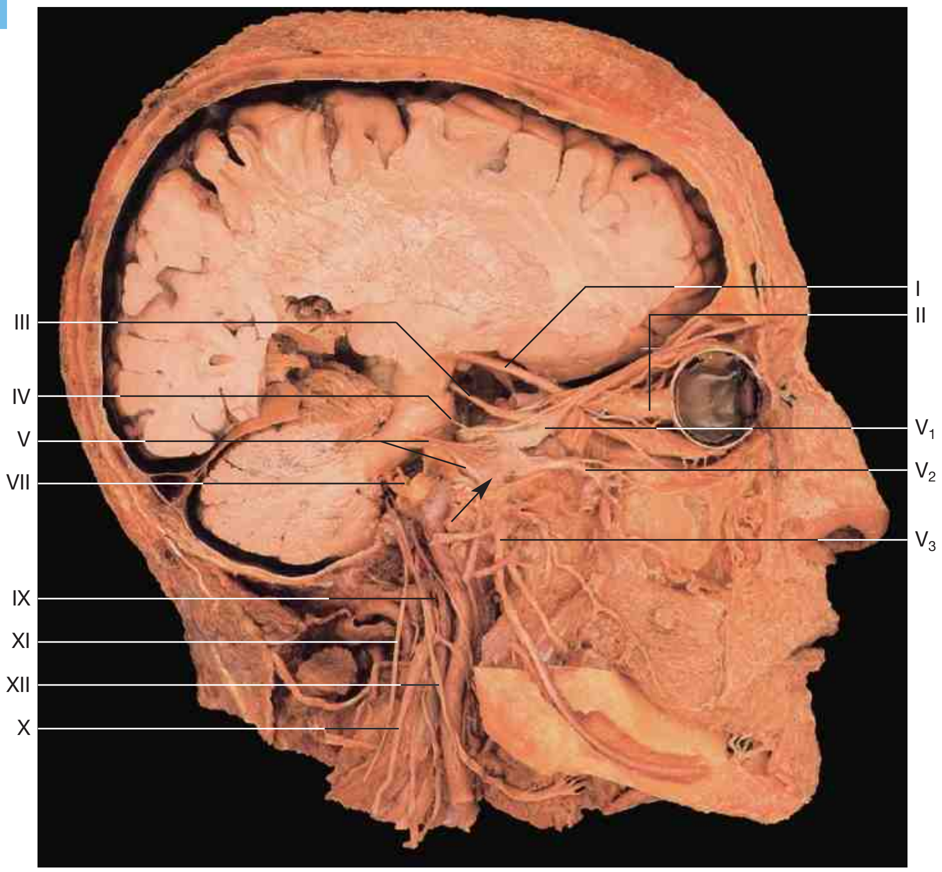
1 Superficial temporal artery

Branches of the first part
2 Deep auricular artery and anterior tympanic artery
3 Middle meningeal artery
4 Inferior alveolar artery

Branches of the second part
5 Deep temporal branches
6 Pterygoid branches
7 Masseteric artery
8 Buccal artery

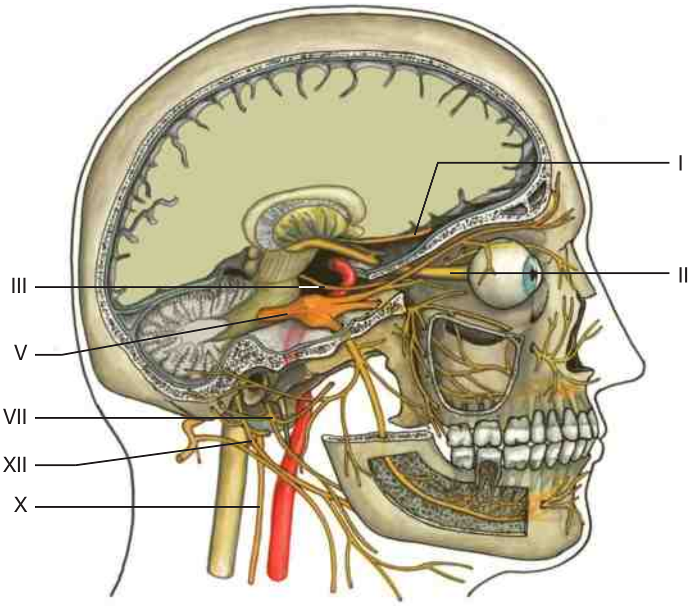
Branches of the third part
9 Posterior superior alveolar artery
10 Infra-orbital artery
11 Sphenopalatine artery and branches to the nasal cavity
12 Descending palatine artery
13 Artery of the pterygoid canal

2.2 Cranial Nerves



Dissection of the cranial nerves (indicated by I–XII) (lateral aspect). Brain, brain stem, and cerebellum have been partly removed (from Lütjen-Drecoll, Rohen, Innenansichten des menschlichen Körpers, 2010).

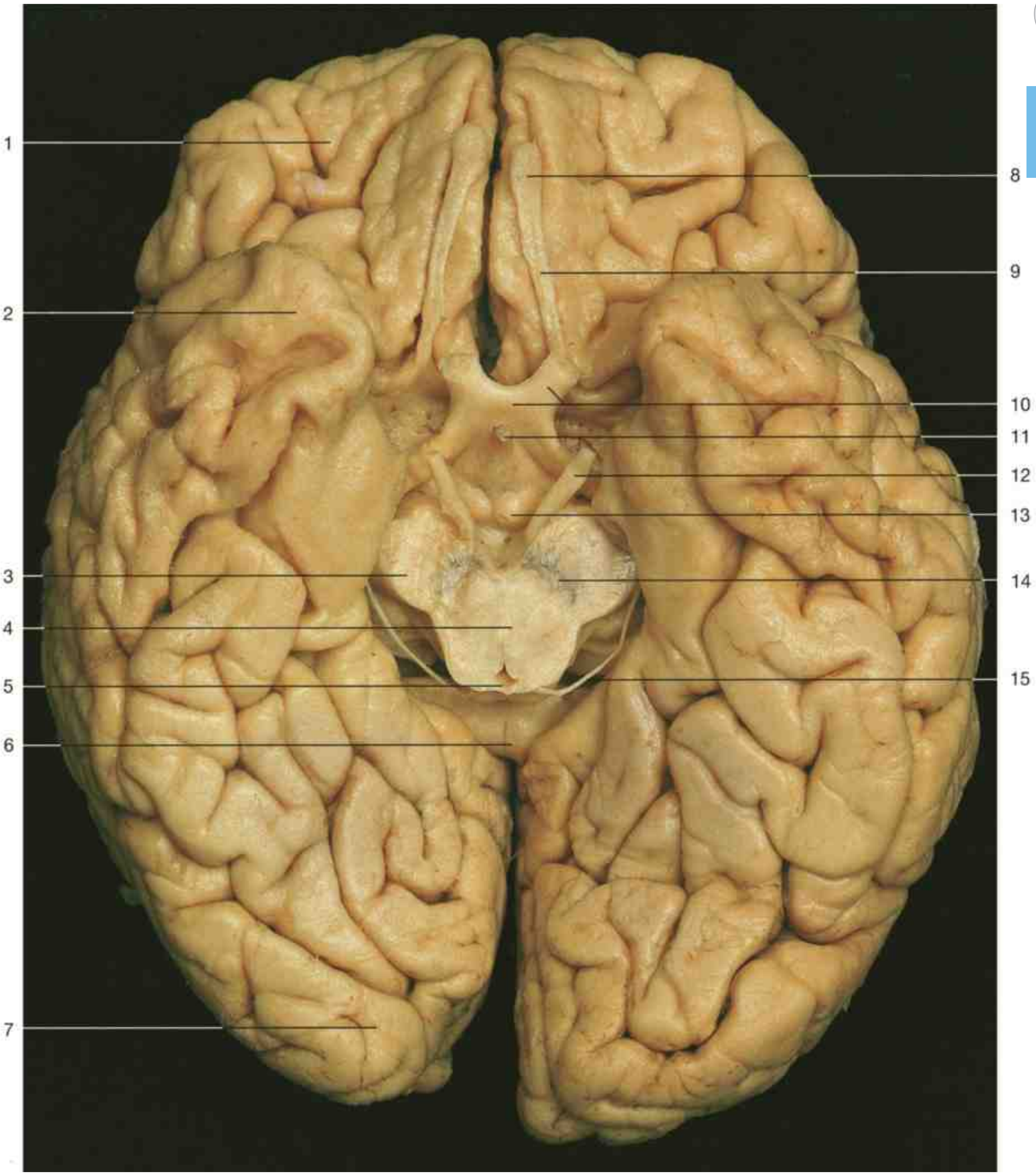
The twelve cranial nerves emerge from the brain stem and penetrate the skull at different places. The olfactory nerves (n. I) pass the lamina cribrosa innervating the upper part of the nasal mucous membrane. The optic nerve (n. II) is related to the eye. The external ocular muscles are innervated by the oculomotor, trochlear, and abducent nerves (n. III, n. IV, and n. VI). Facial skin and masticatory muscles are innervated by the trigeminal nerve (n. V) while the facial nerve (n. VII) innervates mainly the mimic musculature. The stato-acoustic organ is related to the vestibulocochlear nerve (n. VIII). The vagus nerve (n. X) is one of the longest cranial nerves, running through the lateral neck region to reach the thoracic and abdominal cavities. It belongs to the parasympathetic part of the autonomic nervous system. The glossopharyngeal (n. IX), accessory (n. XI), and hypoglossal (n. XII) nerves innervate the muscles of the neck, the tongue, and the pharynx. During human evolution, they were incorporated secondarily into the brain cavity.



Schematic drawing of the cranial nerves (indicated by I–XII) (lateral aspect).

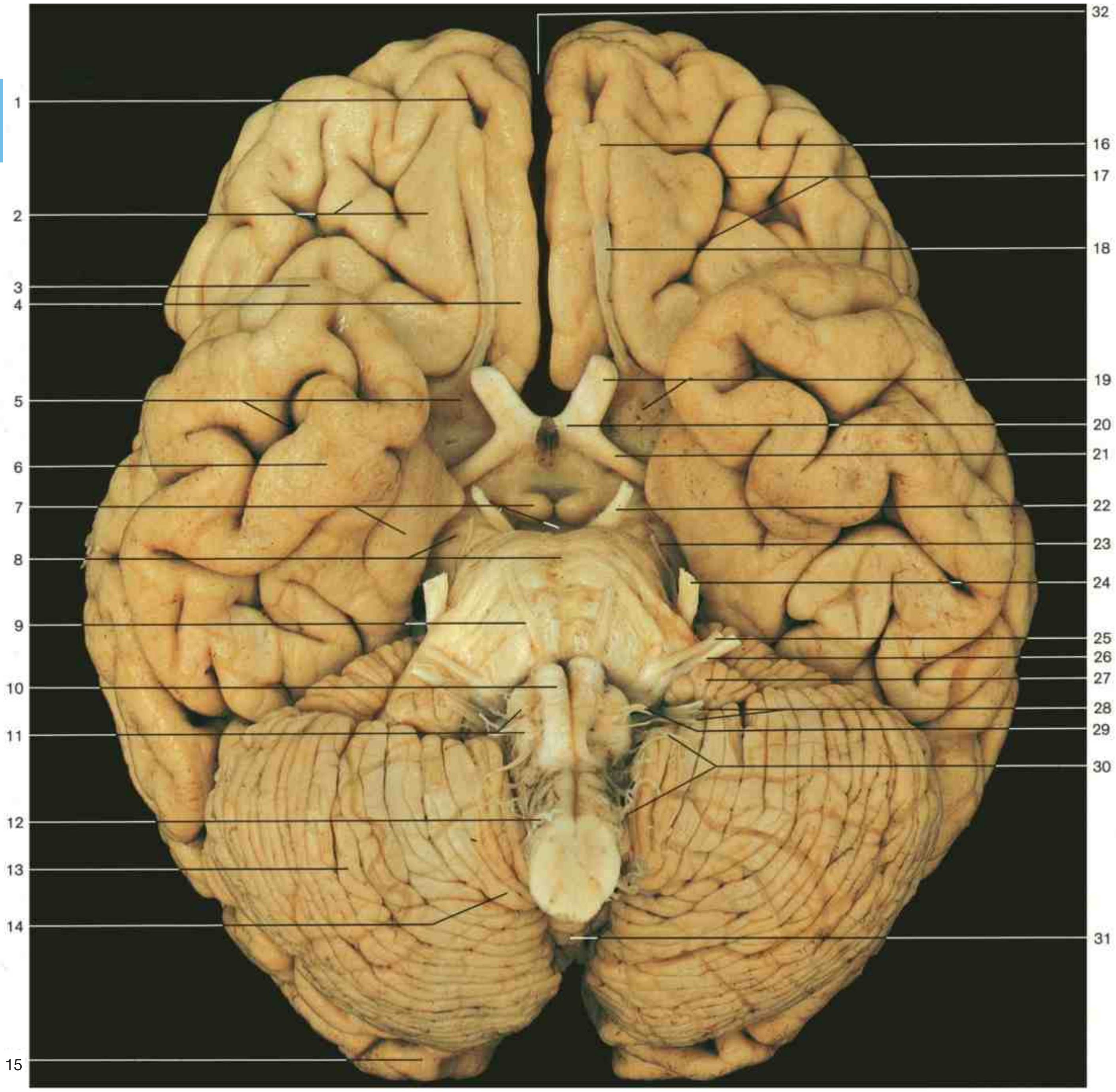
Cranial nerves

I = Olfactory nerves
II = Optic nerve
III = Oculomotor nerve
IV = Trochlear nerve
V = Trigeminal nerve
VI = Abducent nerve
VII = Facial nerve
VIII = Vestibulocochlear nerve
IX = Glossopharyngeal nerve
X = Vagus nerve
XI = Accessory nerve
XII = Hypoglossal nerve



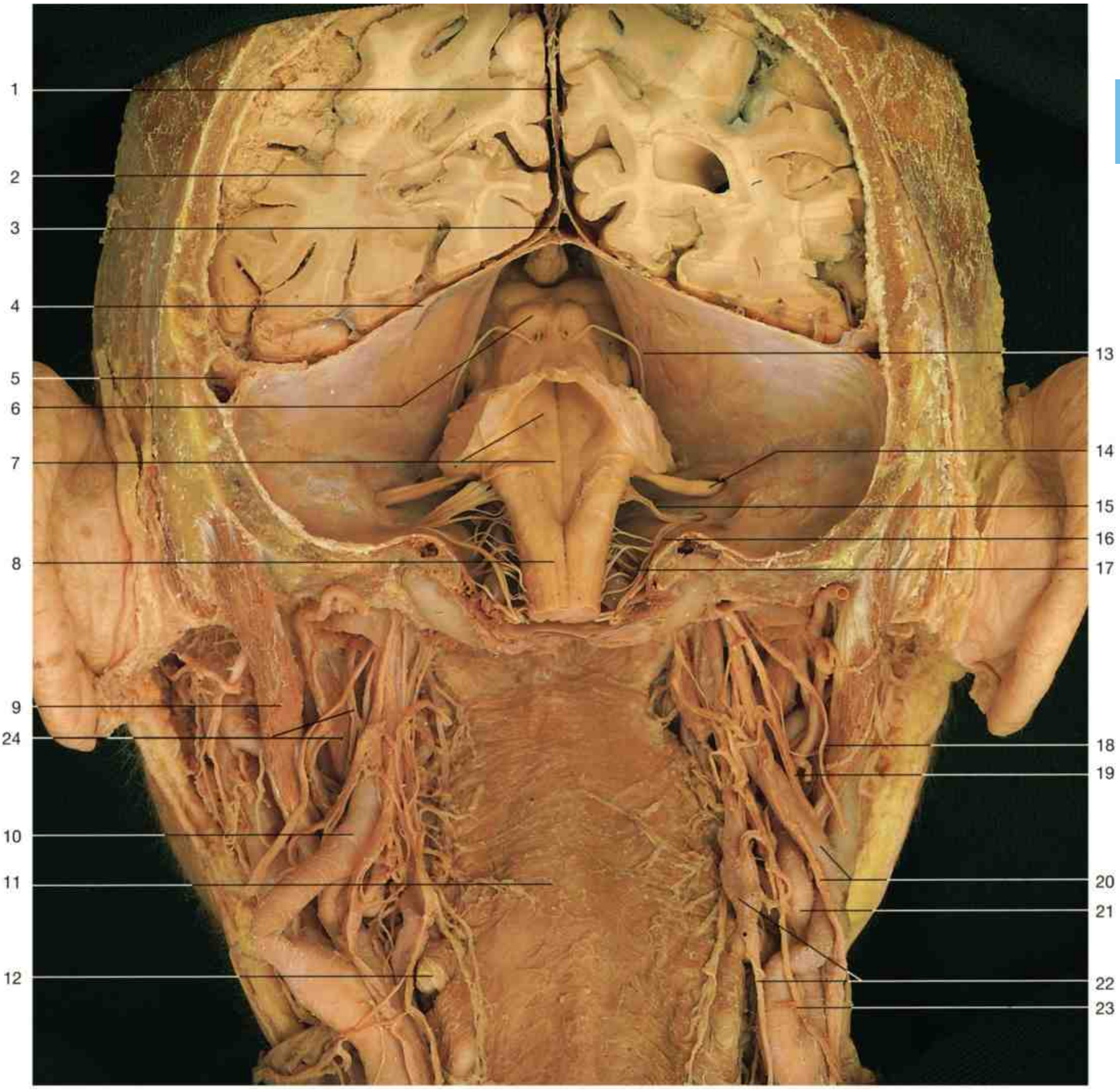
Inferior aspect of the brain with cranial nerves. Midbrain divided.

1	Frontal lobe	9	Olfactory tract
2	Temporal lobe	10	Optic nerve and optic chiasma
3	Pedunculus cerebri	11	Infundibulum
4	Midbrain (divided)	12	Oculomotor nerve (n. III)
5	Cerebral aqueduct	13	Mamillary body
6	Splenium of corpus callosum	14	Substantia nigra
7	Occipital lobe	15	Trochlear nerve (n. IV)
8	Olfactory bulb		



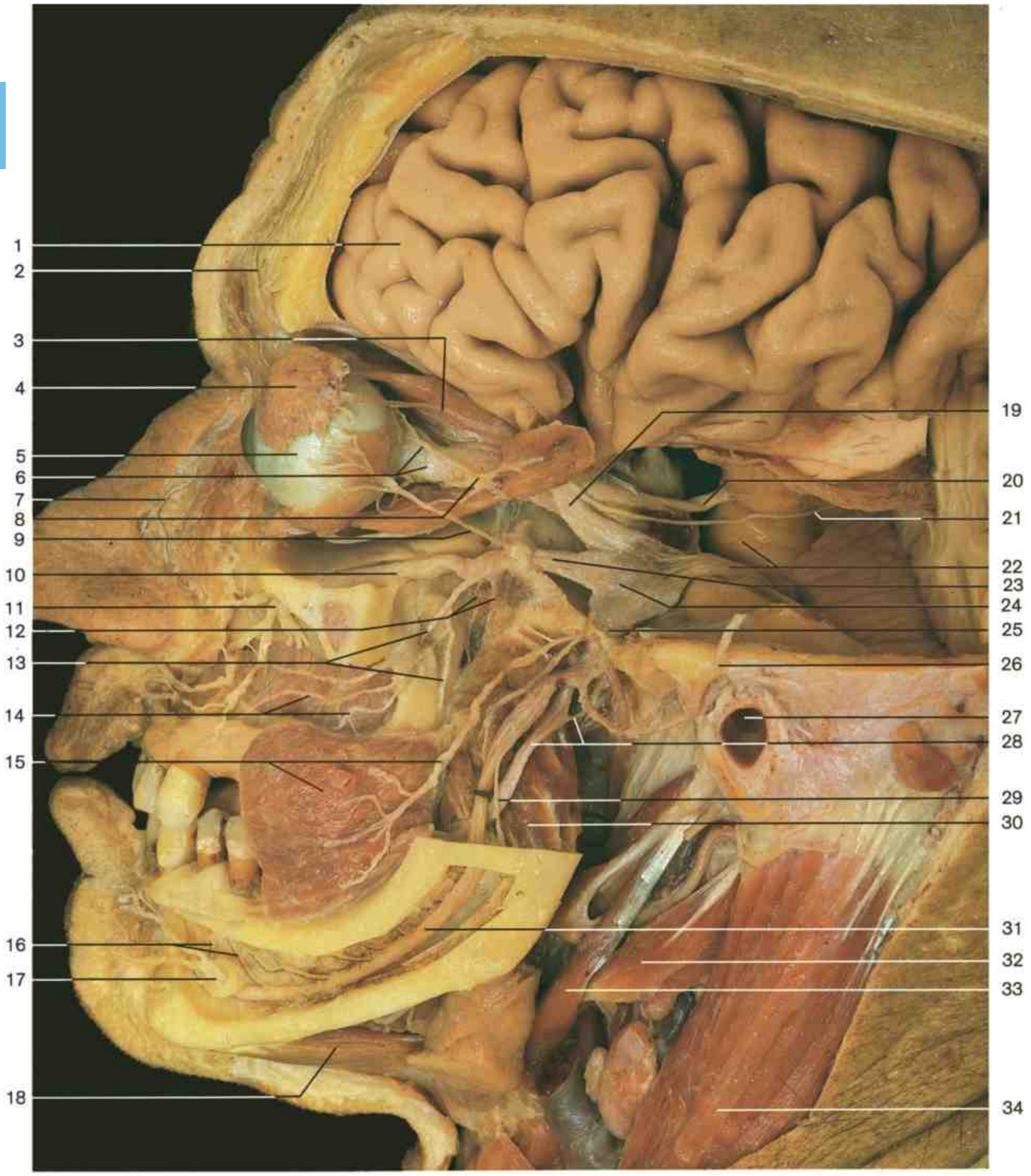
Cranial nerves. Brain (inferior aspect).

1 Olfactory sulcus (termination)
2 Orbital gyri
3 Temporal lobe
4 Straight gyrus
5 Olfactory trigone and inferior temporal sulcus
6 Medial occipitotemporal gyrus
7 Parahippocampal gyrus, mamillary body, and interpeduncular fossa
8 Pons and cerebral peduncle
9 Abducent nerve (n. VI)
10 Pyramid
11 Inferior olive
12 Cervical spinal nerves
13 Cerebellum
14 Tonsil of cerebellum
15 Occipital lobe (posterior pole)
16 Olfactory bulb
17 Orbital sulci of frontal lobe
18 Olfactory tract
19 Optic nerve (n. II) and anterior perforated substance
20 Optic chiasma
21 Optic tract
22 Oculomotor nerve (n. III)
23 Trochlear nerve (n. IV)
24 Trigeminal nerve (n. V)
25 Facial nerve (n. VII)
26 Vestibulocochlear nerve (n. VIII)
27 Flocculus of cerebellum
28 Glossopharyngeal nerve (n. IX) and vagus nerve (n. X)
29 Hypoglossal nerve (n. XII)
30 Accessory nerve (n. XI)
31 Vermis of cerebellum
32 Longitudinal fissure



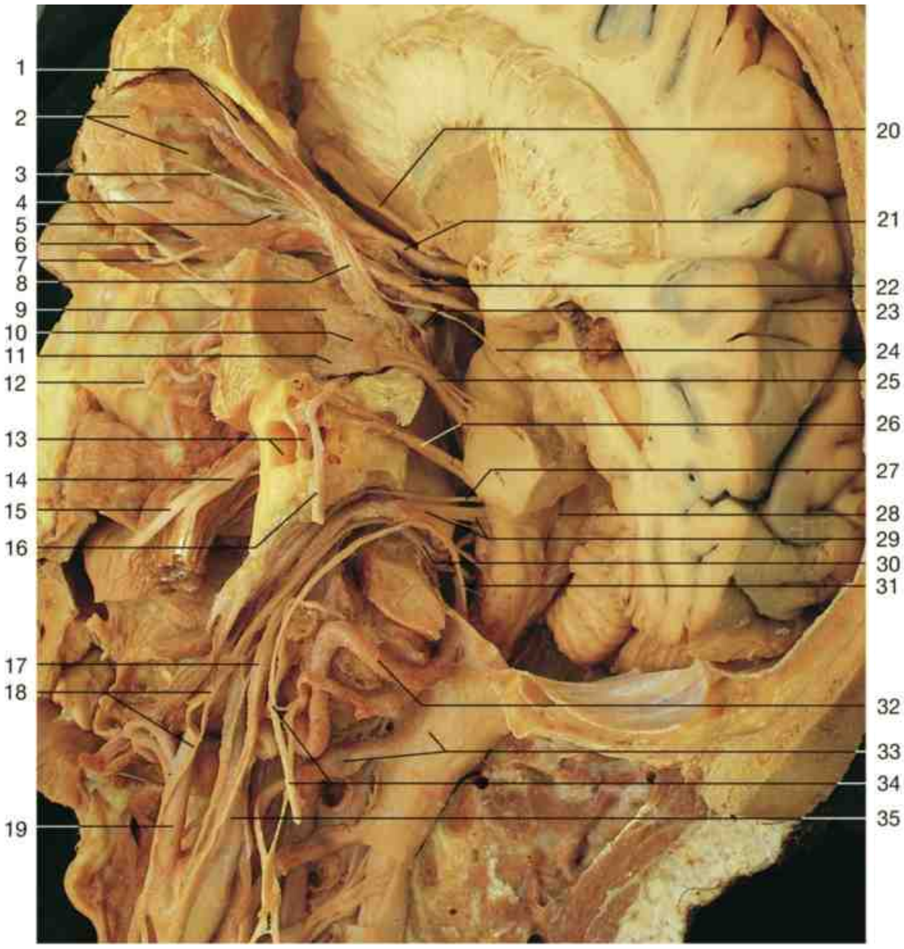
Brain stem and pharynx with cranial nerves (posterior aspect). Cranial cavity opened and cerebellum removed.

1 Falx cerebri
2 Occipital lobe
3 Straight sinus
4 Tentorium cerebelli
5 Transverse sinus
6 Inferior colliculus of midbrain
7 Rhomboid fossa
8 Medulla oblongata
9 Posterior belly of digastric muscle
10 Internal carotid artery
11 Pharynx (middle constrictor muscle)
12 Hyoid bone (greater horn)
13 Trochlear nerve (n. IV)
14 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
15 Glossopharyngeal nerve (n. IX) and vagus nerve (n. X)
16 Accessory nerve (intracranial portion) (n. XI)
17 Hypoglossal nerve (intracranial portion) (n. XII)
18 Accessory nerve (n. XI)
19 Hypoglossal nerve (n. XII)
20 Vagus nerve (n. X) and internal carotid artery
21 External carotid artery
22 Sympathetic trunk and superior cervical ganglion
23 Ansa cervicalis (superior root of hypoglossal nerve)
24 Glossopharyngeal nerve (n. IX) and stylopharyngeus muscle

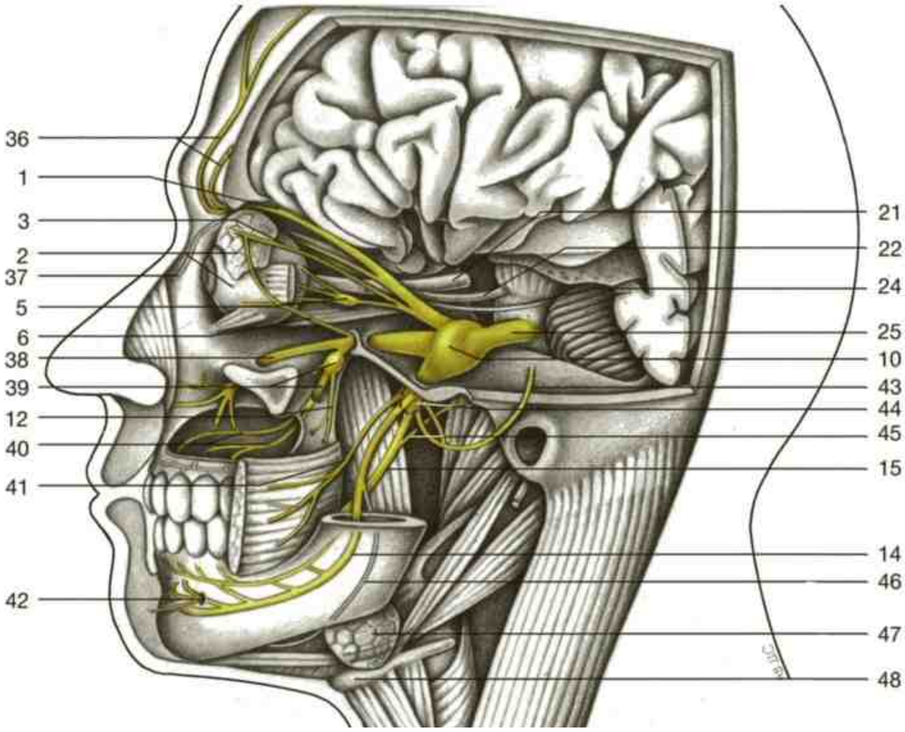


Dissection of the trigeminal nerve in its entirety. Lateral wall of cranial cavity, lateral wall of orbit, zygomatic arch, and ramus of the mandible have been removed and the mandibular canal opened.

1 Frontal lobe of cerebrum
2 Supra-orbital nerve
3 Lacrimal nerve
4 Lacrimal gland
5 Eyeball
6 Optic nerve and short ciliary nerves
7 External nasal branch of anterior ethmoidal nerve
8 Ciliary ganglion
9 Zygomatic nerve
10 Infra-orbital nerve
11 Infra-orbital foramen and terminal branches of infra-orbital nerve
12 Pterygopalatine ganglion and pterygopalatine nerves
13 Posterior superior alveolar nerves
14 Superior dental plexus
15 Buccinator muscle and buccal nerve
16 Inferior dental plexus
17 Mental foramen and mental nerve
18 Anterior belly of digastric muscle
19 Ophthalmic nerve (n. V_1)
20 Oculomotor nerve (n. III)
21 Trochlear nerve (n. IV)
22 Trigeminal nerve and pons
23 Maxillary nerve (n. V_2)
24 Trigeminal ganglion
25 Mandibular nerve (n. V_3)
26 Auriculotemporal nerve
27 External acoustic meatus (divided)
28 Lingual nerve and chorda tympani
29 Mylohyoid nerve
30 Medial pterygoid muscle
31 Inferior alveolar nerve
32 Posterior belly of digastric muscle
33 Stylohyoid muscle
34 Sternocleidomastoid muscle

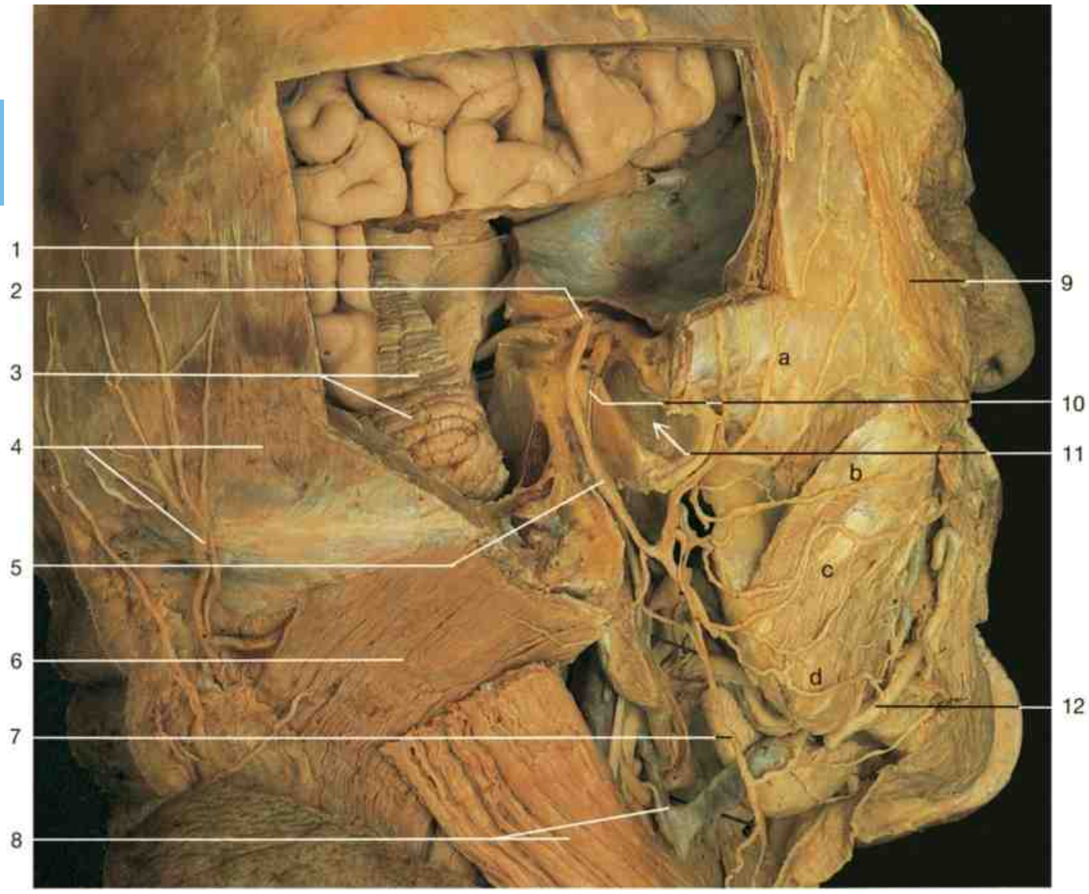


Cranial nerves in connection with the brain stem. Left side (lateral superior aspect). Left half of brain and head partly removed. Notice the location of trigeminal ganglion.

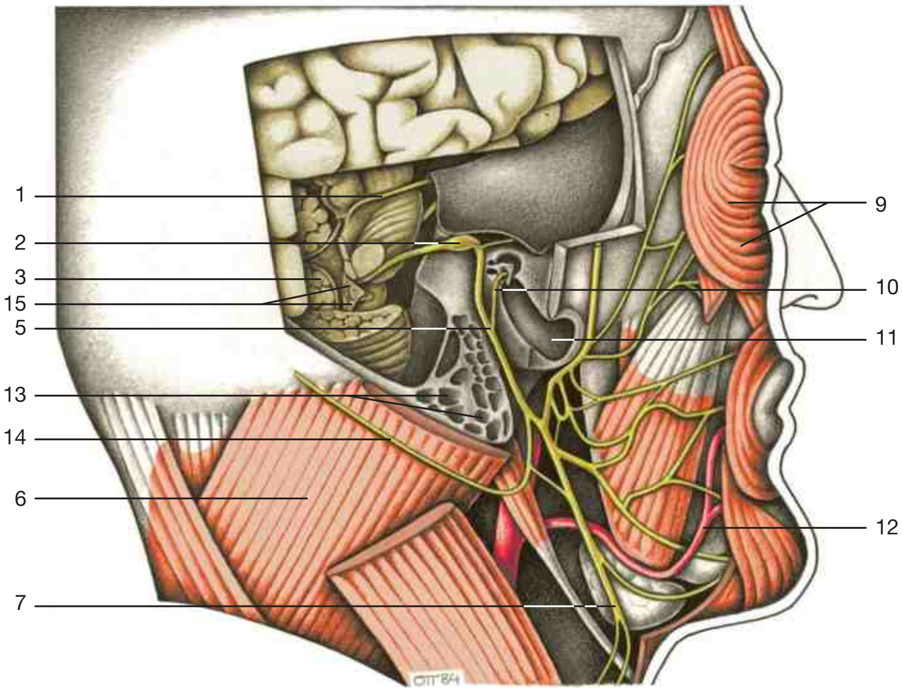


Main branches of trigeminal nerve (schematic drawing of figure on opposite page).

1 Frontal nerve
2 Lacrimal gland and eyeball
3 Lacrimal nerve
4 Lateral rectus muscle
5 Ciliary ganglion lateral to optic nerve
6 Zygomatic nerve
7 Inferior branch of oculomotor nerve
8 Ophthalmic nerve (n. V_1)
9 Maxillary nerve (n. V_2)
10 Trigeminal ganglion
11 Mandibular nerve (n. V_3)
12 Posterior superior alveolar nerves
13 Tympanic cavity, external acoustic meatus, and tympanic membrane
14 Inferior alveolar nerve
15 Lingual nerve
16 Facial nerve (n. VII)
17 Vagus nerve (n. X)
18 Hypoglossal nerve (n. XII) and superior root of ansa cervicalis
19 External carotid artery
20 Olfactory tract (n. I)
21 Optic nerve (n. II) (intracranial part)
22 Oculomotor nerve (n. III)
23 Abducent nerve (n. VI)
24 Trochlear nerve (n. IV)
25 Trigeminal nerve (n. V)
26 Vestibulocochlear nerve (n. VIII) and facial nerve (n. VII)
27 Glossopharyngeal nerve (n. IX) (leaving brain stem)
28 Rhomboid fossa
29 Vagus nerve (n. X) (leaving brain stem)
30 Hypoglossal nerve (n. XII) (leaving medulla oblongata)
31 Accessory nerve (n. XI) (ascending from foramen magnum)
32 Vertebral artery
33 Spinal ganglion and dura mater of spinal cord
34 Accessory nerve (n. XI)
35 Internal carotid artery
36 Lateral and medial branch of supra-orbital nerve
37 Infratrochlear nerve
38 Infra-orbital nerve
39 Pterygopalatine ganglion and middle superior alveolar nerve
40 Middle superior alveolar nerves (entering superior dental plexus)
41 Buccal nerve
42 Mental nerve and mental foramen
43 Auriculotemporal nerve
44 Otic ganglion (dotted line)
45 Chorda tympani
46 Mylohyoid nerve
47 Submandibular gland
48 Hyoid bone



Dissection of facial nerve in its entirety. Cranial cavity fenestrated; temporal lobe partly removed. Facial canal and tympanic cavity opened, posterior wall of external acoustic meatus removed. **Branches of facial nerve:** a = temporal branch; b = zygomatic branches; c = buccal branches; d = marginal mandibular branch.



Facial nerve (schematic drawing of the dissection above).

1	Trochlear nerve
2	Facial nerve with geniculate ganglion
3	Cerebellum (right hemisphere)
4	Occipital belly of occipitofrontalis muscle and greater occipital nerve
5	Facial nerve at stylomastoid foramen
6	Splenius capitis muscle
7	Cervical branch of facial nerve
8	Sternocleidomastoid muscle and retromandibular vein
9	Orbicularis oculi muscle
10	Chorda tympani
11	External acoustic meatus
12	Facial artery
13	Mastoid air cells
14	Posterior auricular nerve
15	Nucleus and genu of facial nerve

Cranial nerves in connection with the brain stem (oblique-lateral aspect). Lateral portion of the skull, brain, neck and facial structures, lateral wall of orbit and oral cavity have been removed. The tympanic cavity has been opened. The mandible has been divided and the muscles of mastication have been removed.

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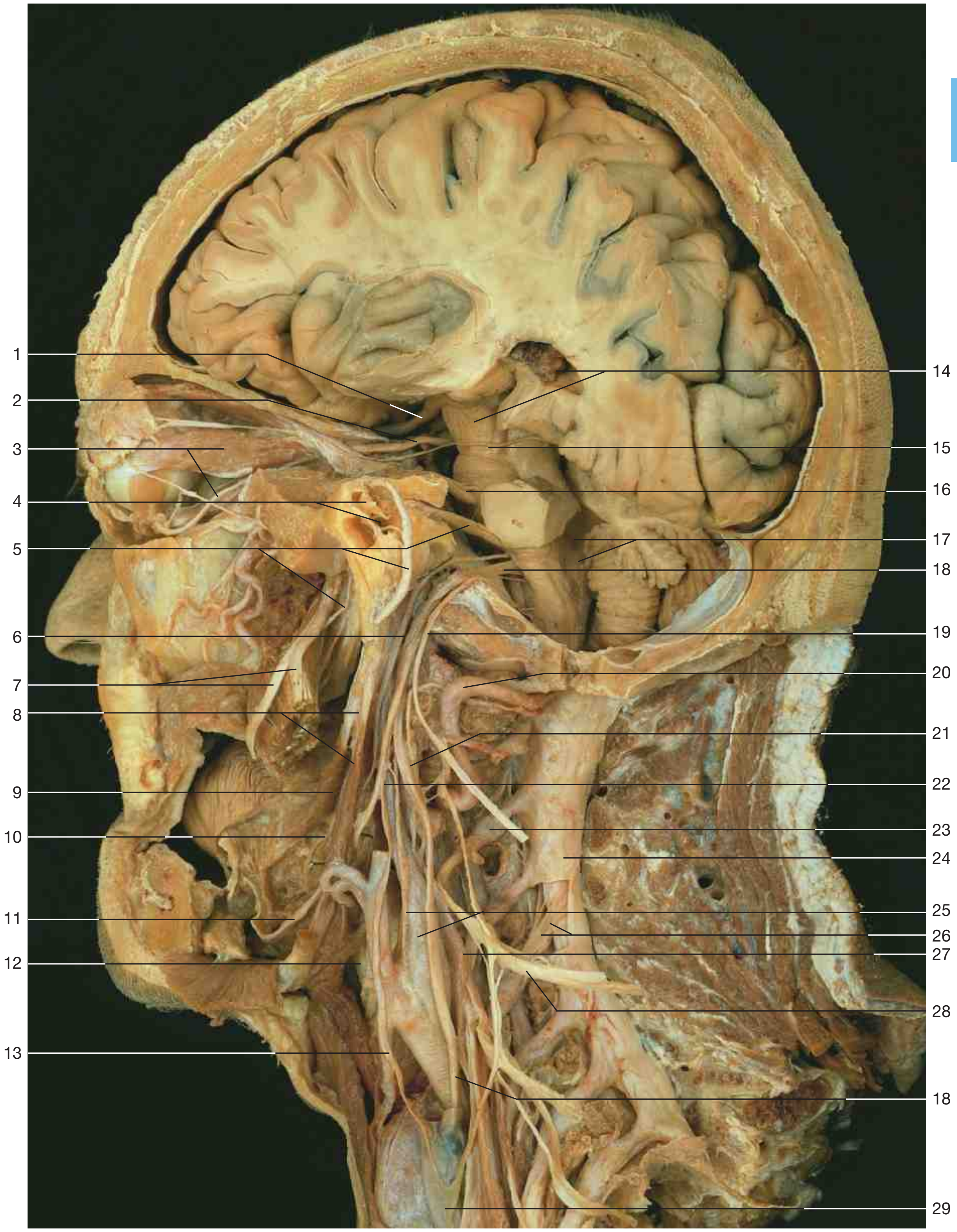
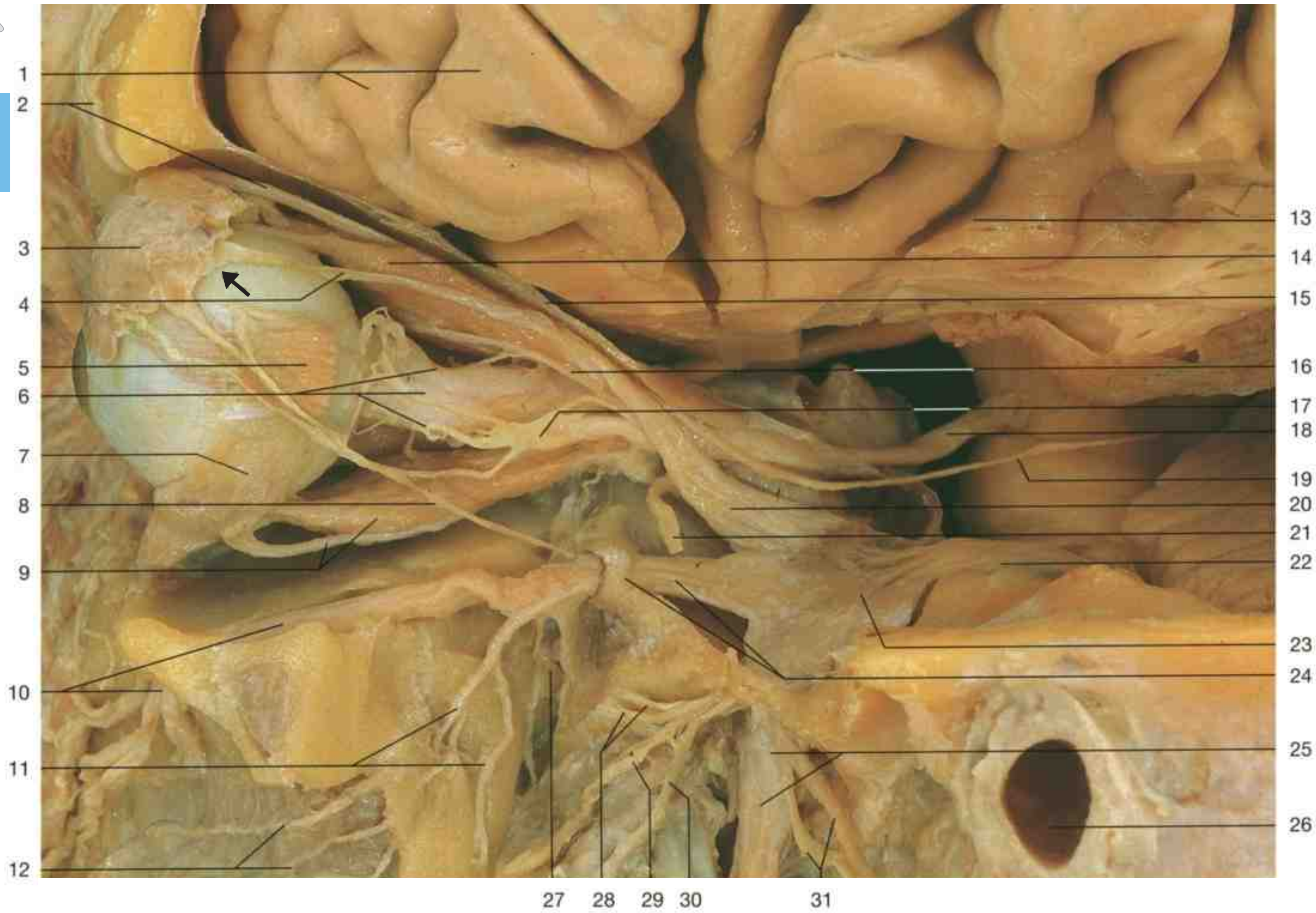
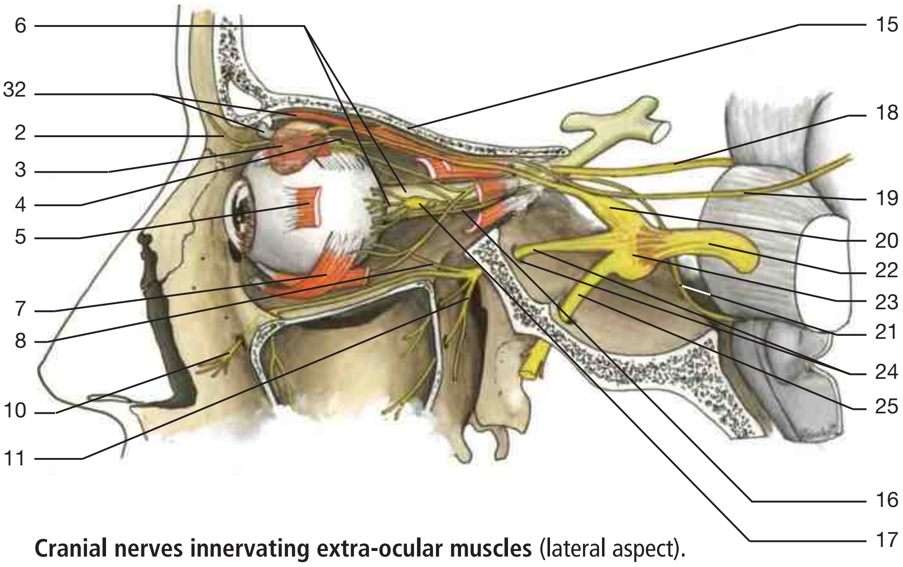


1 Optic tract
2 Oculomotor nerve (n. III)
3 Lateral rectus muscle and inferior branch of oculomotor nerve
4 Malleus and chorda tympani
5 Chorda tympani, facial nerve (n. VII), and vestibulocochlear nerve (n. VIII)
6 Glossopharyngeal nerve (n. XI)
7 Lingual nerve and inferior alveolar nerve
8 Styloid process and stylohyoid muscle
9 Styloglossus muscle
10 Lingual branches of glossopharyngeal nerve
11 Lingual branch of hypoglossal nerve
12 External carotid artery
13 Superior root of ansa cervicalis (branch of hypoglossal nerve, derived from C_1)
14 Lateral ventricle with choroid plexus and cerebral peduncle
15 Trochlear nerve (n. IV)
16 Trigeminal nerve (n. V)
17 Fourth ventricle and rhomboid fossa
18 Vagus nerve (n. X)
19 Accessory nerve (n. XI)
20 Vertebral artery
21 Superior cervical ganglion
22 Hypoglossal nerve (n. XII)
23 Spinal ganglion with dural sheath
24 Dura mater of spinal cord
25 Internal carotid artery and carotid sinus branch of glossopharyngeal nerve
26 Dorsal roots of spinal nerve
27 Sympathetic trunk
28 Branch of cervical plexus (ventral primary ramus of third cervical spinal nerve)
29 Ansa cervicalis

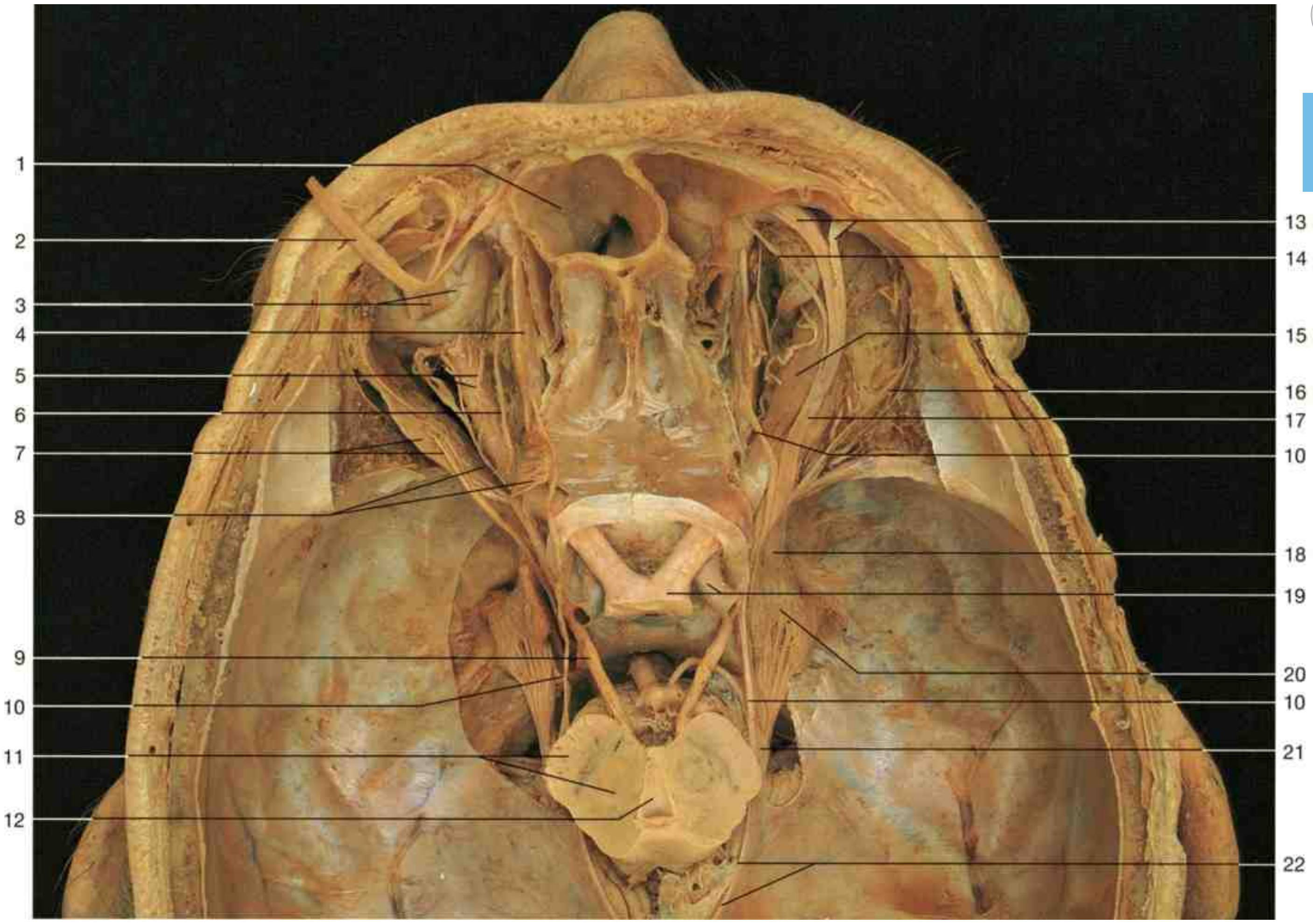


Cranial nerves of the orbit and pterygopalatine fossa. Left orbit (lateral aspect). Note the zygomaticolacrimal anastomosis (arrow).

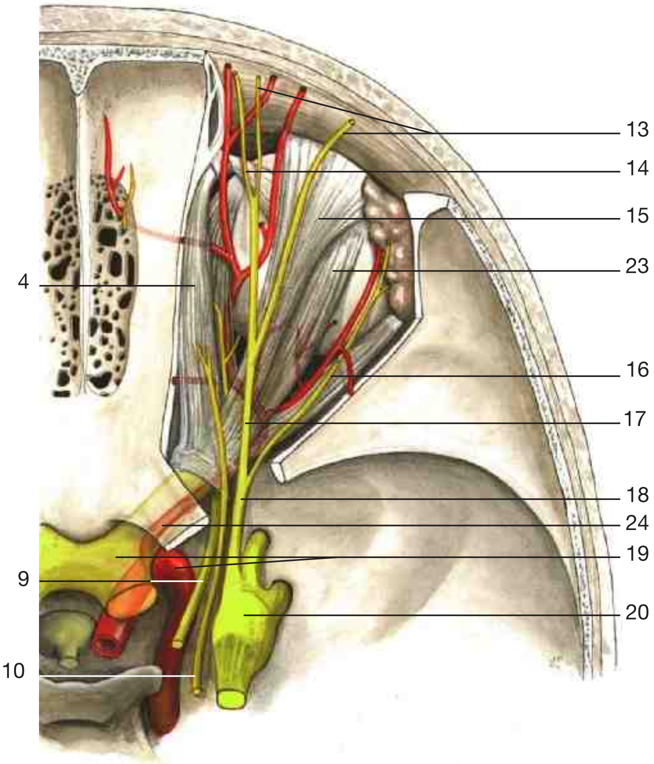
1 Frontal lobe
2 Supra-orbital nerve
3 Lacrimal gland
4 Lacrimal nerve
5 Lateral rectus muscle (divided)
6 Optic nerve and short ciliary nerves
7 Inferior oblique muscle
8 Zygomatic nerve
9 Inferior branch of oculomotor nerve and inferior rectus muscle
10 Infra-orbital nerve
11 Posterior superior alveolar nerves
12 Branches of superior alveolar plexus adjacent to mucous membrane of maxillary sinus
13 Central sulcus of insula
14 Superior rectus muscle
15 Periorbita (roof of orbit)
16 Nasociliary nerve
17 Ciliary ganglion
18 Oculomotor nerve (n. III)
19 Trochlear nerve (n. IV)
20 Ophthalmic nerve (n. V_1)
21 Abducent nerve (n. VI) (divided)
22 Trigeminal nerve (n. V)
23 Trigeminal ganglion
24 Maxillary nerve (n. V_2) and foramen rotundum
25 Mandibular nerve (n. V_3)
26 External acoustic meatus
27 Pterygopalatine nerves
28 Deep temporal nerves
29 Buccal nerve
30 Masseteric nerve
31 Auriculotemporal nerve
32 Trochlea and superior oblique muscle



Cranial nerves innervating extra-ocular muscles (lateral aspect). (Schematic drawing.)

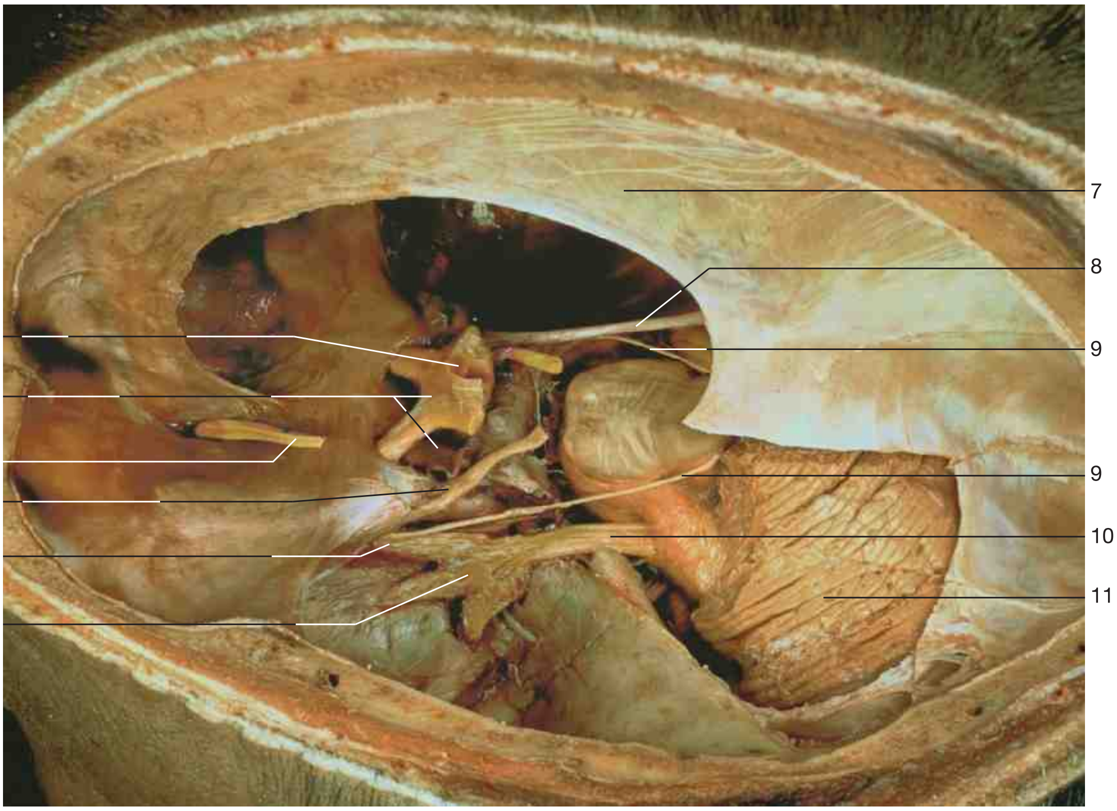


Cranial nerves of the orbit (superior aspect). Right side: superficial layer, left side: middle layer of the orbit (superior rectus muscle and frontal nerve divided and reflected). Tentorium and dura mater partly removed.

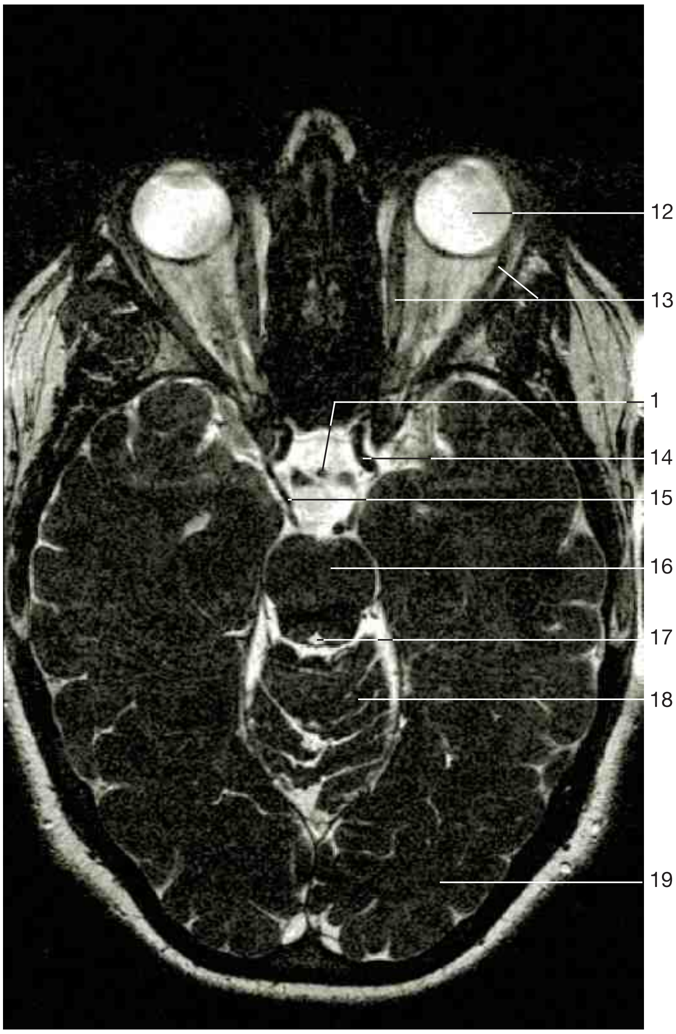


Cranial nerves within the orbit (superior aspect).

1	Frontal sinus (enlarged)
2	Frontal nerve (divided and reflected)
3	Superior rectus muscle (divided) and eyeball
4	Superior oblique muscle
5	Short ciliary nerves and optic nerve (n. II)
6	Nasociliary nerve
7	Abducent nerve (n. VI) and lateral rectus muscle
8	Ciliary ganglion and superior rectus muscle (reflected)
9	Oculomotor nerve (n. III)
10	Trochlear nerve (n. IV)
11	Crus cerebri and midbrain
12	Inferior wall of the third ventricle connected with cerebral aqueduct
13	Lateral and medial branches of supra-orbital nerve
14	Supratrochlear nerve
15	Superior levator palpebrae muscle
16	Lacrimal nerve
17	Frontal nerve
18	Ophthalmic nerve (n. V_1)
19	Optic chiasma and internal carotid artery
20	Trigeminal ganglion
21	Trigeminal nerve (n. V)
22	Tentorial notch
23	Superior rectus muscle
24	Ophthalmic artery

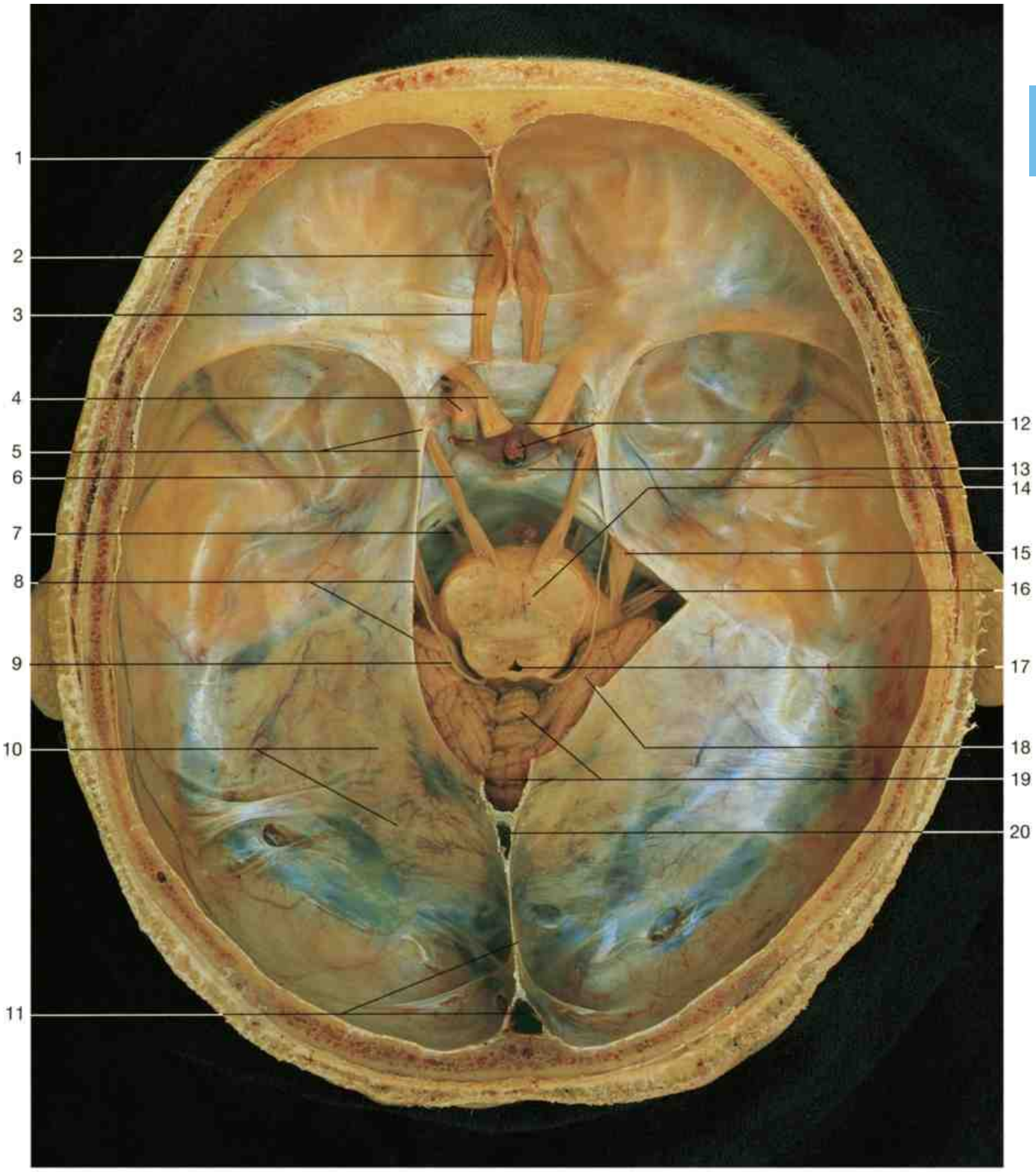


Cranial nerves at the base of the skull. The brain stem was divided and the tentorium fenestrated. Both hemispheres were removed.



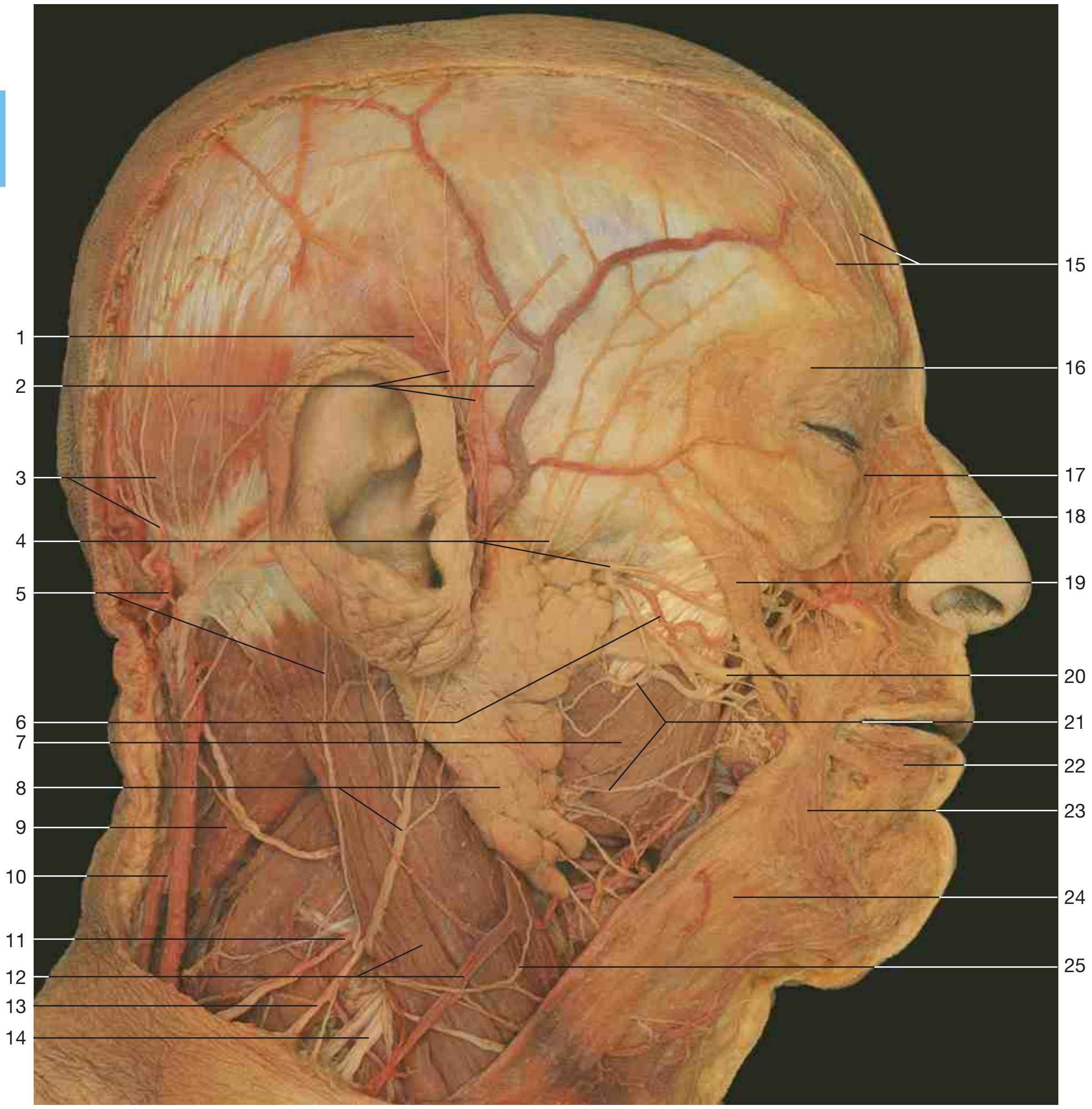
1	Infundibulum
2	Optic chiasma and internal carotid artery
3	Olfactory tract
4	Oculomotor nerve (n. III)
5	Ophthalmic nerve (n. V1)
6	Trigeminal ganglion
7	Falx cerebri
8	Tentorial notch
9	Trochlear nerve (n. IV)
10	Trigeminal nerve (n. V)
11	Cerebellum
12	Eyeball
13	Medial and lateral rectus muscles
14	Internal carotid artery
15	Oculomotor nerve (n. III)
16	Midbrain
17	Cerebral aqueduct
18	Vermis of cerebellum
19	Occipital lobe of the cerebrum
20	Basilar artery

Section through the head at the level of the sella turcica demonstrating cranial nerves (MRI scan, University of Erlangen, Dpt. of Neurosurgery).



Base of the skull with cranial nerves (internal aspect). Both cerebral hemispheres and upper part of the brain stem removed. Incision on the right tentorium cerebelli to display the cranial nerves of the infratentorial space.

1 Superior sagittal sinus with falx cerebri
2 Olfactory bulb
3 Olfactory tract
4 Optic nerve and internal carotid artery
5 Anterior clinoid process and anterior attachment of tentorium cerebelli
6 Oculomotor nerve (n. III)
7 Abducent nerve (n. VI)
8 Tentorial notch (incisura tentorii)
9 Trochlear nerve (n. IV)
10 Tentorium cerebelli
11 Falx cerebri and confluence of sinuses
12 Hypophysial fossa, infundibulum, and diaphragma sellae
13 Dorsum sellae
14 Midbrain (divided)
15 Trigeminal nerve (n. V)
16 Facial nerve (n. VII), nervus intermedius, and vestibulocochlear nerve (n. VIII)
17 Cerebral aqueduct
18 Right hemisphere of cerebellum
19 Vermis of cerebellum
20 Straight sinus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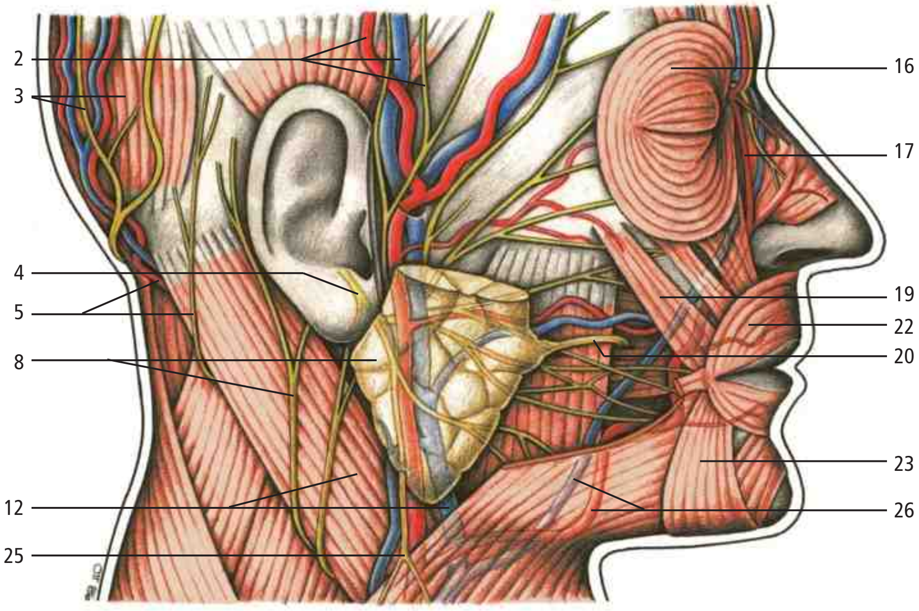
Lateral superficial aspect of the face. Peripheral distribution of facial nerve (n. VII).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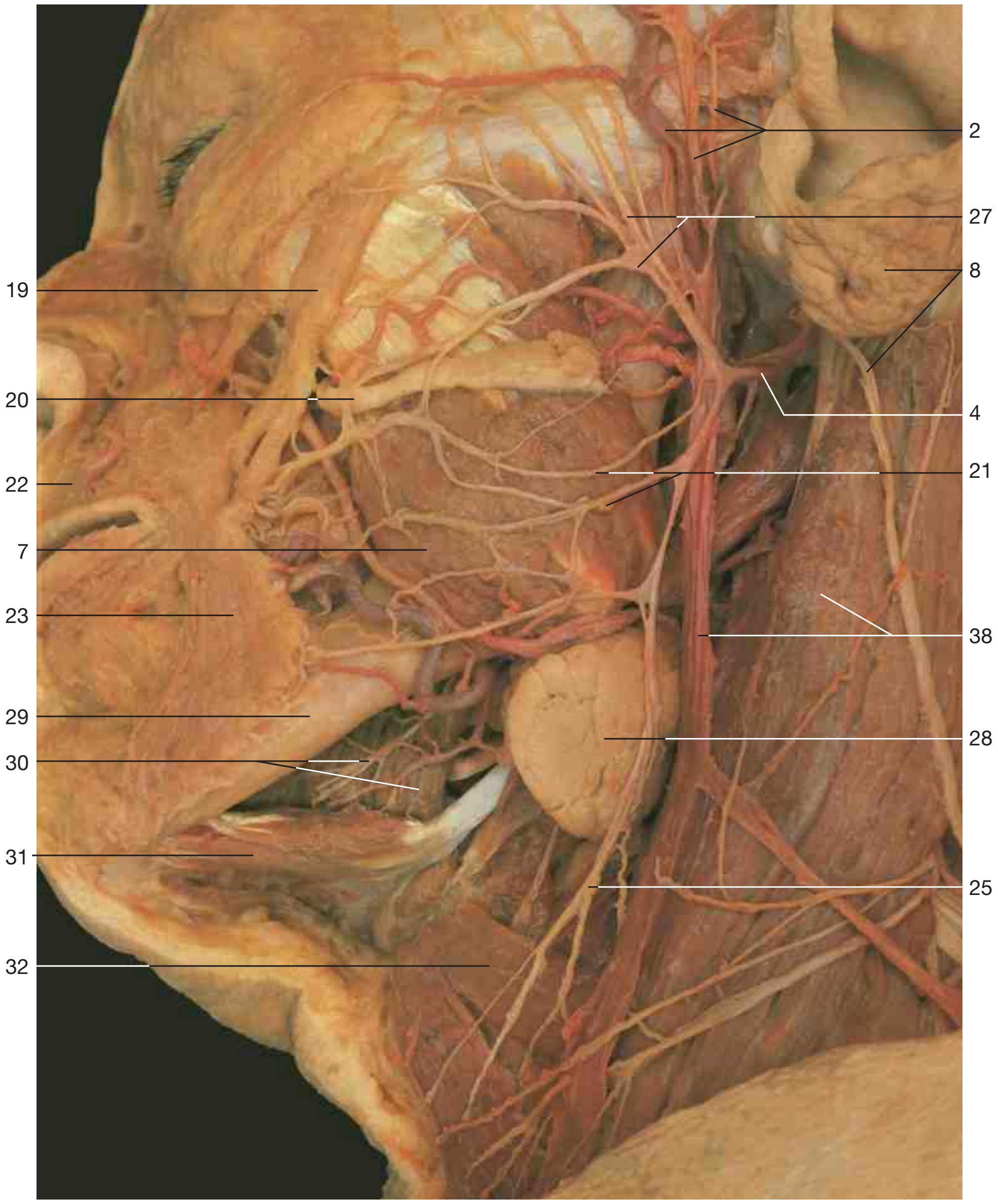
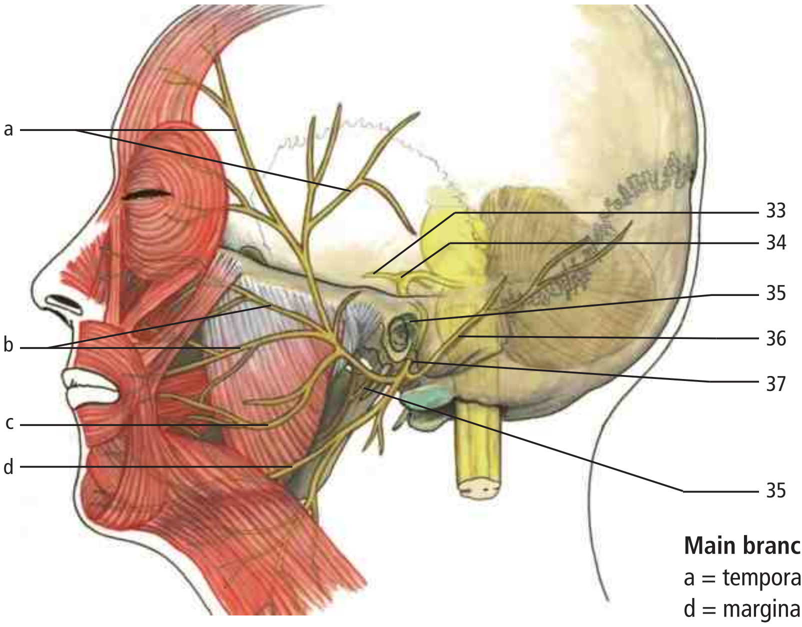
Superficial region of the face. Note the facial plexus within the parotid gland (semischematic drawing).

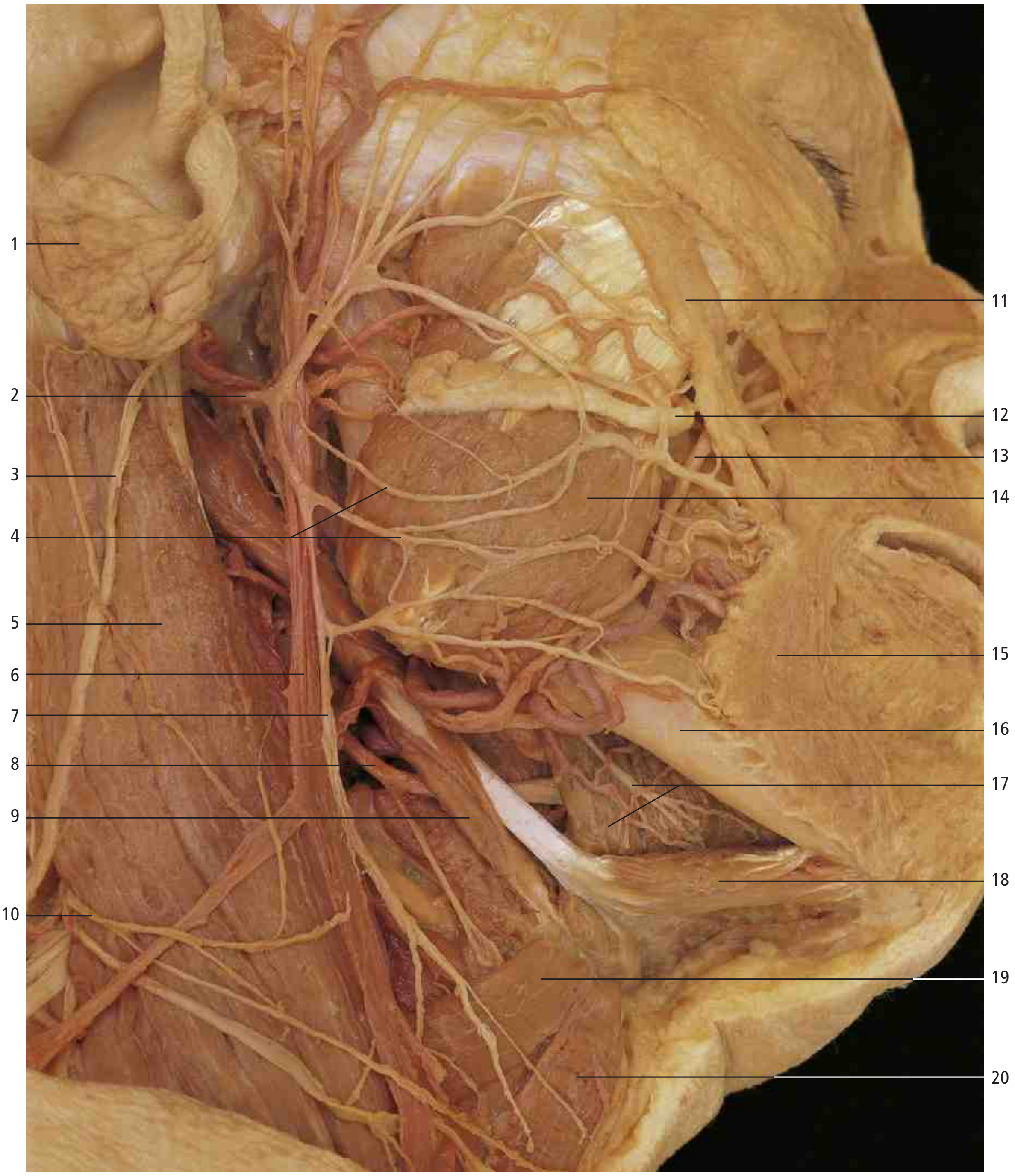


Deep dissection of facial nerve. Retromandibular and submandibular regions of the head (lateral aspect). The parotid gland has been removed.

1	Temporoparietalis muscle
2	Superficial temporal artery and vein, and auriculotemporal nerve
3	Occipital belly of occipitofrontalis muscle and greater occipital nerve (C_2)
4	Facial nerve (n. VII)
5	Lesser occipital nerve and occipital artery
6	Transverse facial artery
7	Masseter muscle
8	Parotid gland and great auricular nerve
9	Splenius capitis muscle
10	Trapezius muscle
11	Punctum nervosum, point of distribution of cutaneous nerves of cervical plexus
12	Sternocleidomastoid muscle and external jugular vein
13	Supraclavicular nerves
14	Brachial plexus
15	Supra-orbital nerves
16	Orbicularis oculi muscle
17	Angular artery (terminal branch of facial artery)
18	Nasalis muscle
19	Zygomaticus major muscle
20	Parotid duct
21	Zygomatic and buccal branches of facial nerve
22	Orbicularis oris muscle
23	Depressor anguli oris muscle
24	Platysma muscle
25	Cervical branch of facial nerve (anastomosing with transverse cervical nerve of cervical plexus)
26	Facial artery and vein
27	Temporal branches of facial nerve
28	Submandibular gland
29	Mandible
30	Mylohyoideus muscle and nerve
31	Anterior belly of digastric muscle
32	Omohyoid muscle
33	Greater petrosal nerve
34	Geniculate ganglion
35	Chorda tympani
36	Posterior auricular nerve
37	Stylomastoid foramen
38	Sternocleidomastoid muscle and retromandibular vein

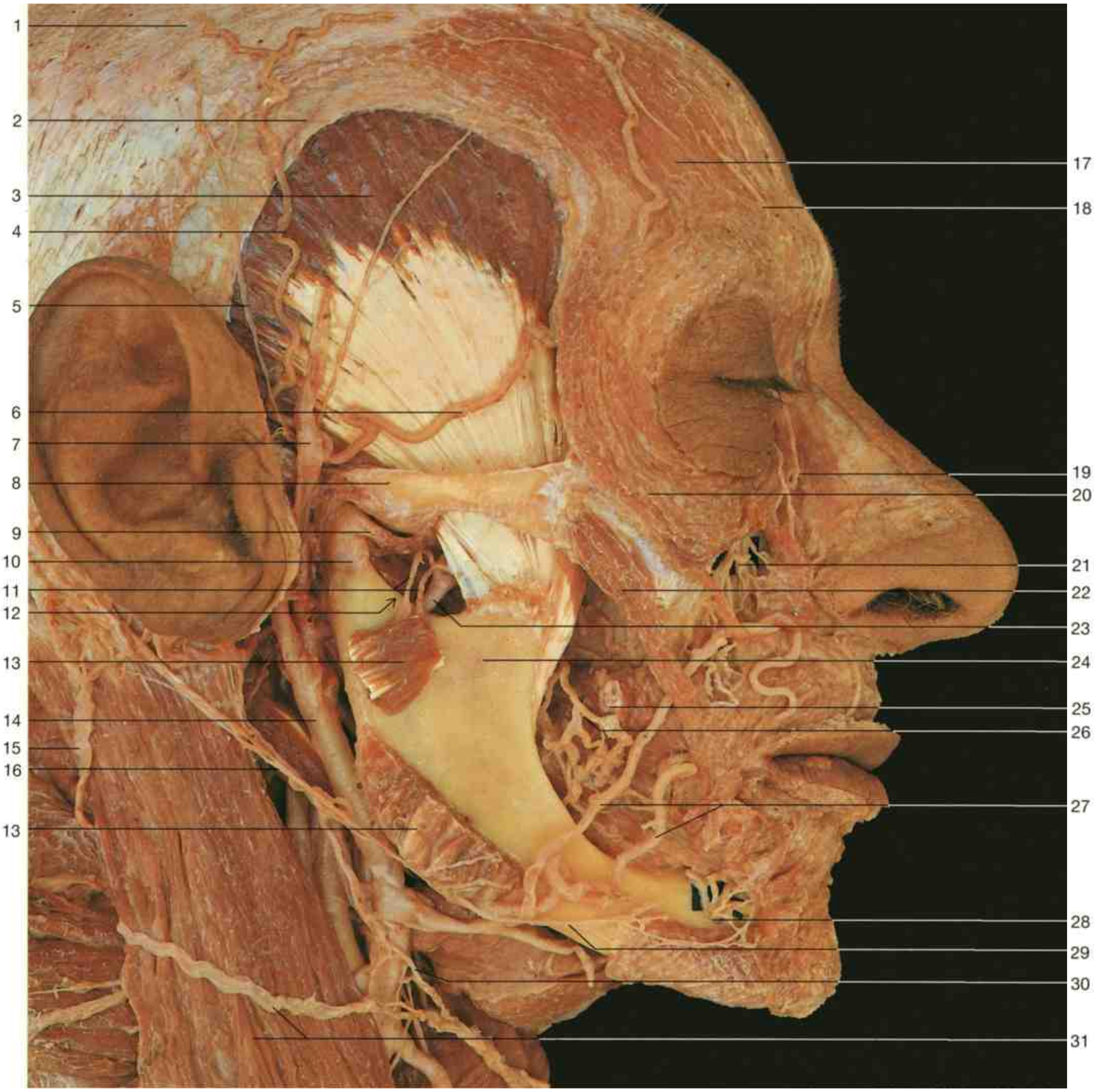


Main branches of facial nerve (schematic drawing).
a = temporal branches; b = zygomatic branches; c = buccal branches; d = marginal mandibular branch.



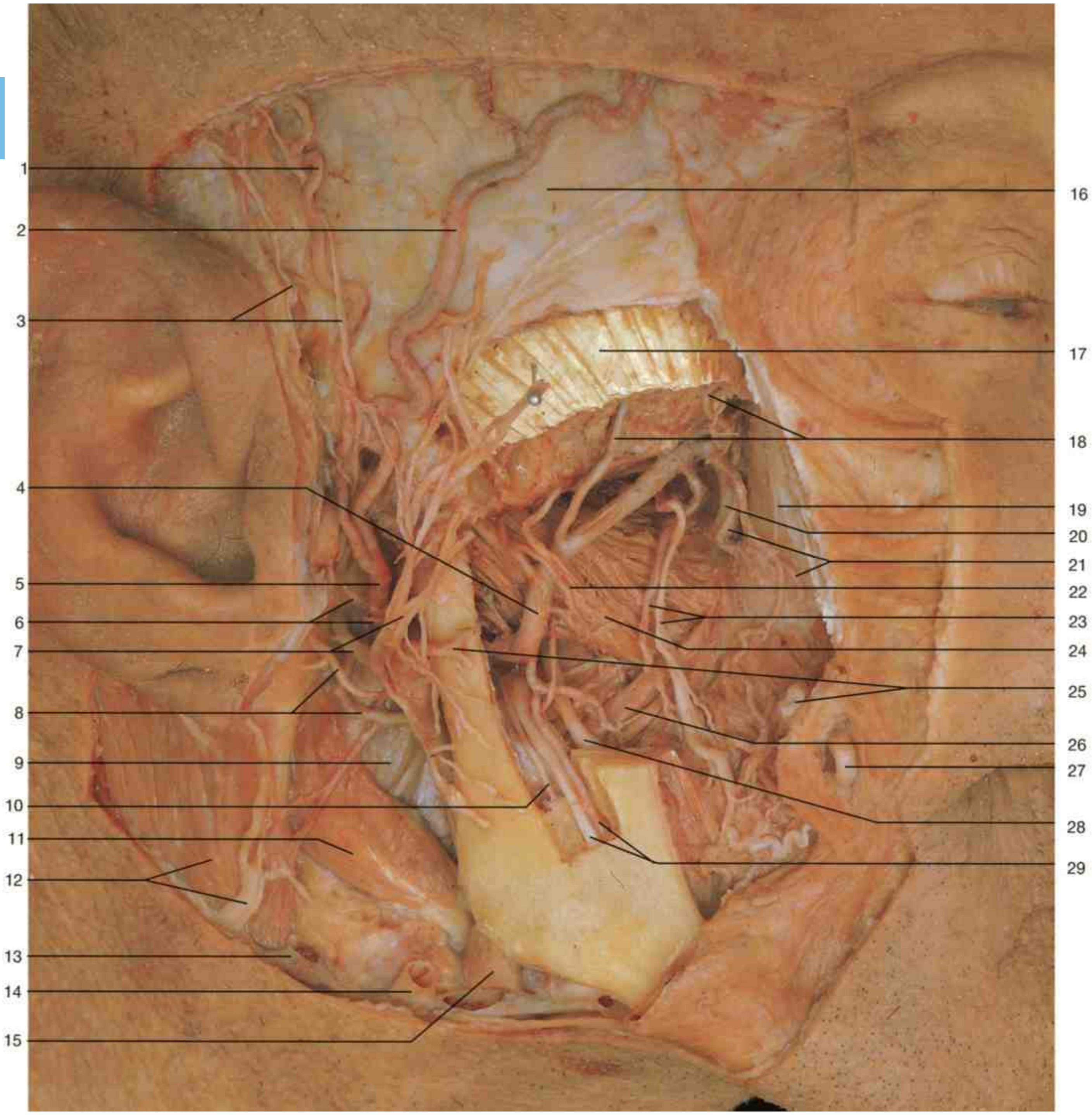
Deep dissection of facial nerve. Retromandibular and submandibular regions of the head (lateral aspect). The parotid gland and the submandibular gland have been removed. The parotid plexus (4) is formed by anastomosis of the temporal, zygomatic, buccal, marginal mandibular, and cervical branches of the facial nerve, arising in the parotid gland.

1	Parotid gland	8	Hypoglossal nerve (n. XII)	15	Depressor anguli oris muscle
2	Facial nerve (n. VII)	9	Stylohyoid muscle	16	Mandible
3	Great auricular nerve	10	Transverse cervical nerve	17	Mylohyoid muscle and nerve
4	Parotid plexus	11	Zygomaticus major muscle	18	Anterior belly of digastric muscle
5	Sternocleidomastoid muscle	12	Parotid duct	19	Omohyoid muscle
6	Retromandibular vein	13	Facial artery	20	Sternohyoid muscle
7	Cervical branch of facial nerve	14	Masseter muscle		



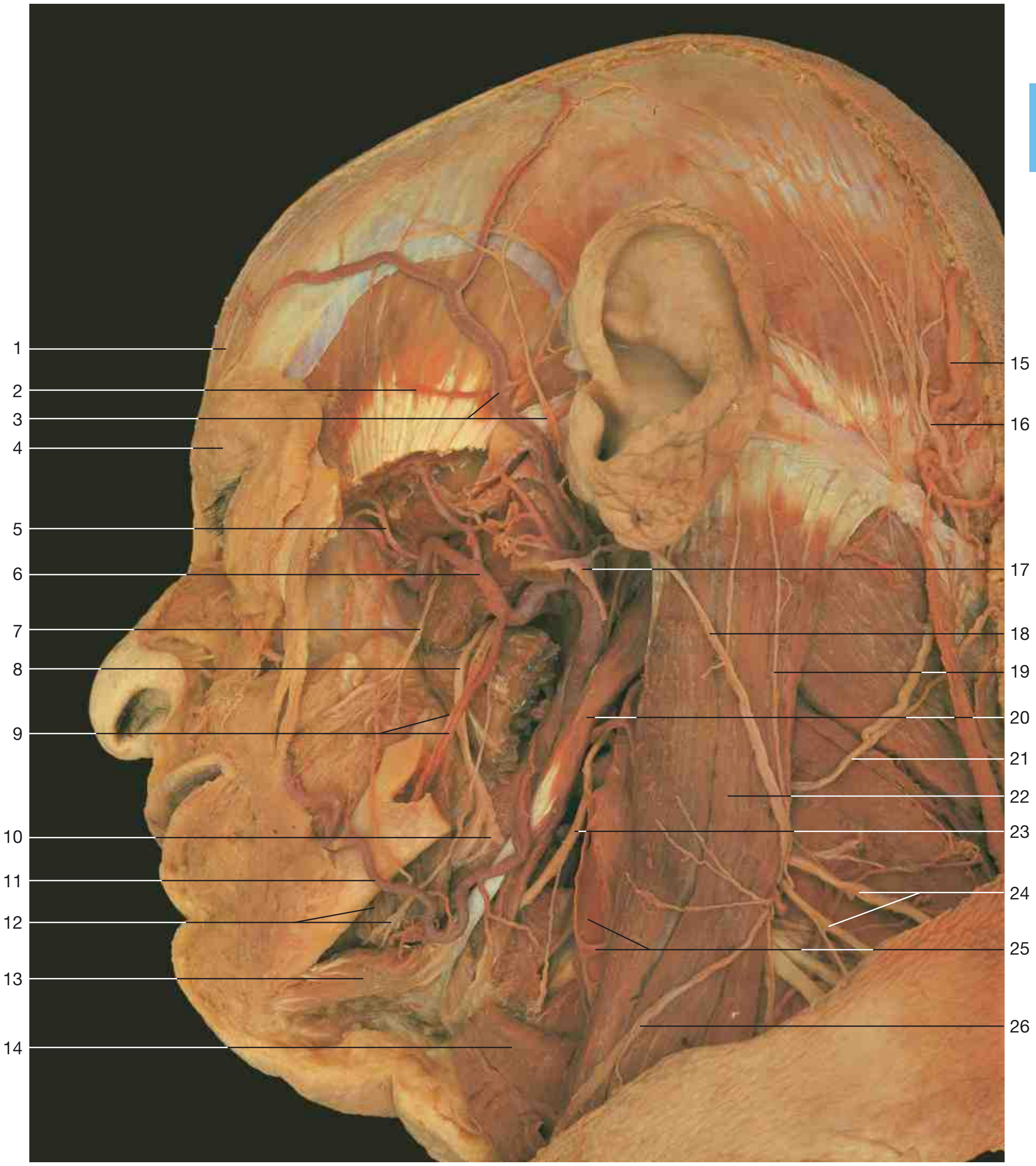
Lateral superficial aspect of the face. Masseter muscle and temporal fascia have been partly removed to display the masseteric artery and nerve.

1 Galea aponeurotica
2 Temporal fascia
3 Temporalis muscle
4 Parietal branch of superficial temporal artery
5 Auriculotemporal nerve
6 Frontal branch of superficial temporal artery
7 Superficial temporal vein
8 Zygomatic arch
9 Articular disc of temporomandibular joint
10 Head of mandible
11 Masseteric artery and nerve
12 Mandibular notch
13 Masseter muscle (divided)
14 External carotid artery
15 Great auricular nerve
16 Facial nerve (reflected)
17 Frontal belly of occipitofrontalis muscle
18 Medial branch of supra-orbital nerve
19 Angular artery
20 Orbicularis oculi muscle
21 Infra-orbital nerve
22 Zygomaticus major muscle
23 Maxillary artery
24 Coronoid process
25 Parotid duct (divided)
26 Buccal nerve
27 Facial artery and vein
28 Mental nerve
29 Mandibular branch of facial nerve
30 Cervical branch of facial nerve
31 Transverse cervical nerve (communicating branch with facial nerve) and sternocleidomastoid muscle



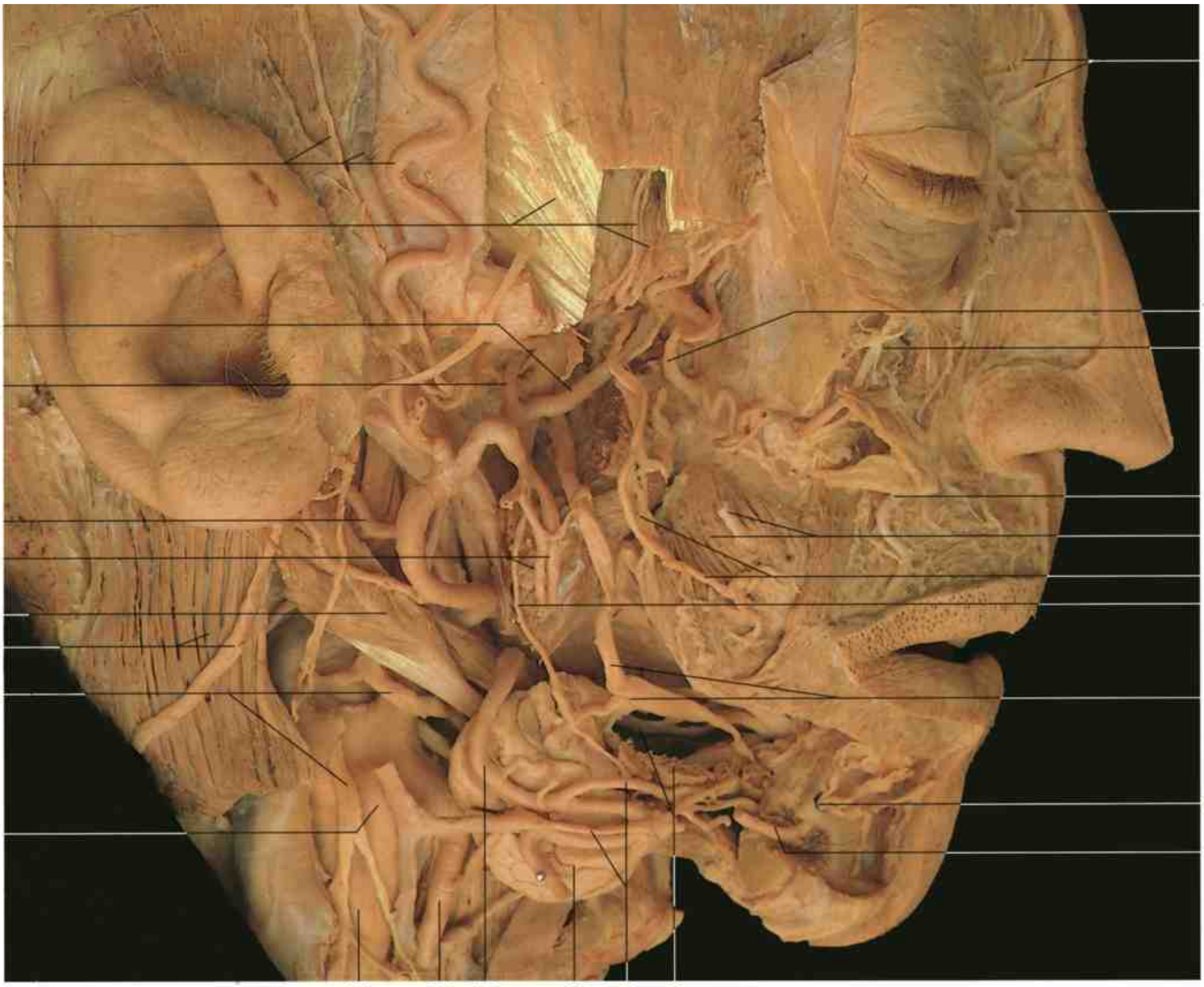
Deep dissection of facial and retromandibular regions. The coronoid process together with the insertions of temporalis muscle have been removed to display the maxillary artery. The upper part of the mandibular canal has been opened.

1 Parietal branch of the superficial temporal artery
2 Frontal branch of the superficial temporal artery
3 Auriculotemporal nerve
4 Maxillary artery
5 Superficial temporal artery
6 Communicating branches between facial and auriculotemporal nerves
7 Facial nerve
8 Posterior auricular artery and anterior auricular branch of superficial temporal artery
9 Internal jugular vein
10 Mylohyoid nerve
11 Posterior belly of digastric muscle
12 Great auricular nerve and sternocleidomastoid muscle
13 External jugular vein
14 Retromandibular vein
15 Submandibular gland
16 Temporal fascia
17 Temporalis tendon
18 Deep temporal arteries
19 Posterior superior alveolar nerve
20 Sphenopalatine artery
21 Posterior superior alveolar arteries
22 Masseteric artery and nerve
23 Buccal nerve and artery
24 Lateral pterygoid
25 Transverse facial artery and parotid duct (divided)
26 Medial pterygoid muscle
27 Facial artery
28 Lingual nerve
29 Inferior alveolar artery and nerve (mandibular canal opened)

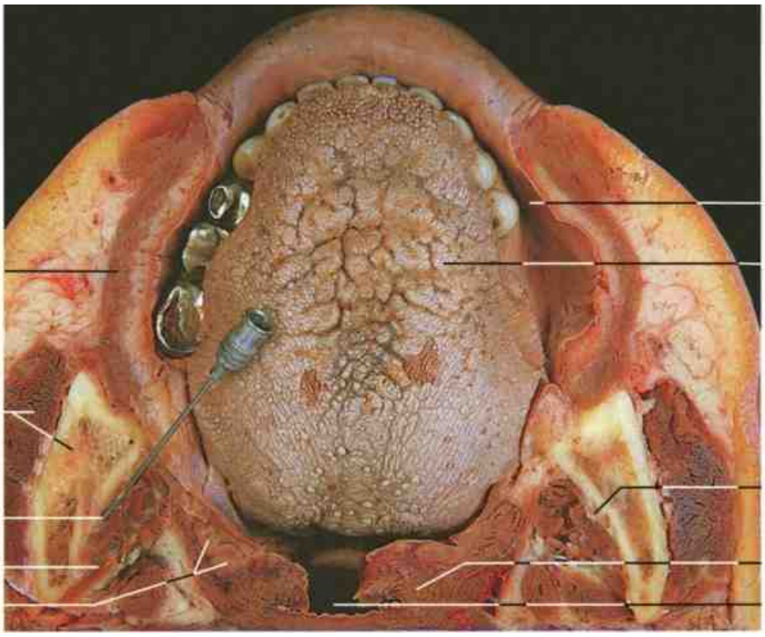


Peripharyngeal and retromandibular regions. The mandible has been partly removed (oblique lateral aspect).

1 Supra-orbital nerve (medial branch)
2 Temporalis muscle
3 Superficial temporal artery and auriculotemporal nerve
4 Orbicularis oculi muscle
5 Anterior deep temporal artery
6 Maxillary artery
7 Buccal nerve
8 Lingual nerve
9 Inferior alveolar nerve and artery
10 Submandibular ganglion
11 Facial artery
12 Mylohyoid muscle and nerve
13 Anterior belly of digastric muscle
14 Omohyoid muscle
15 Occipital artery
16 Greater occipital nerve (C_2)
17 Facial nerve (cut) (n. VII)
18 Great auricular nerve
19 Lesser occipital nerve
20 Posterior belly of digastric muscle
21 Accessory nerve (Var.)
22 Sternocleidomastoid muscle
23 Hypoglossus nerve (n. XII)
24 Supraclavicular nerves (lateral and intermedial branches)
25 Internal jugular vein and ansa cervicalis
26 Anterior supraclavicular nerve

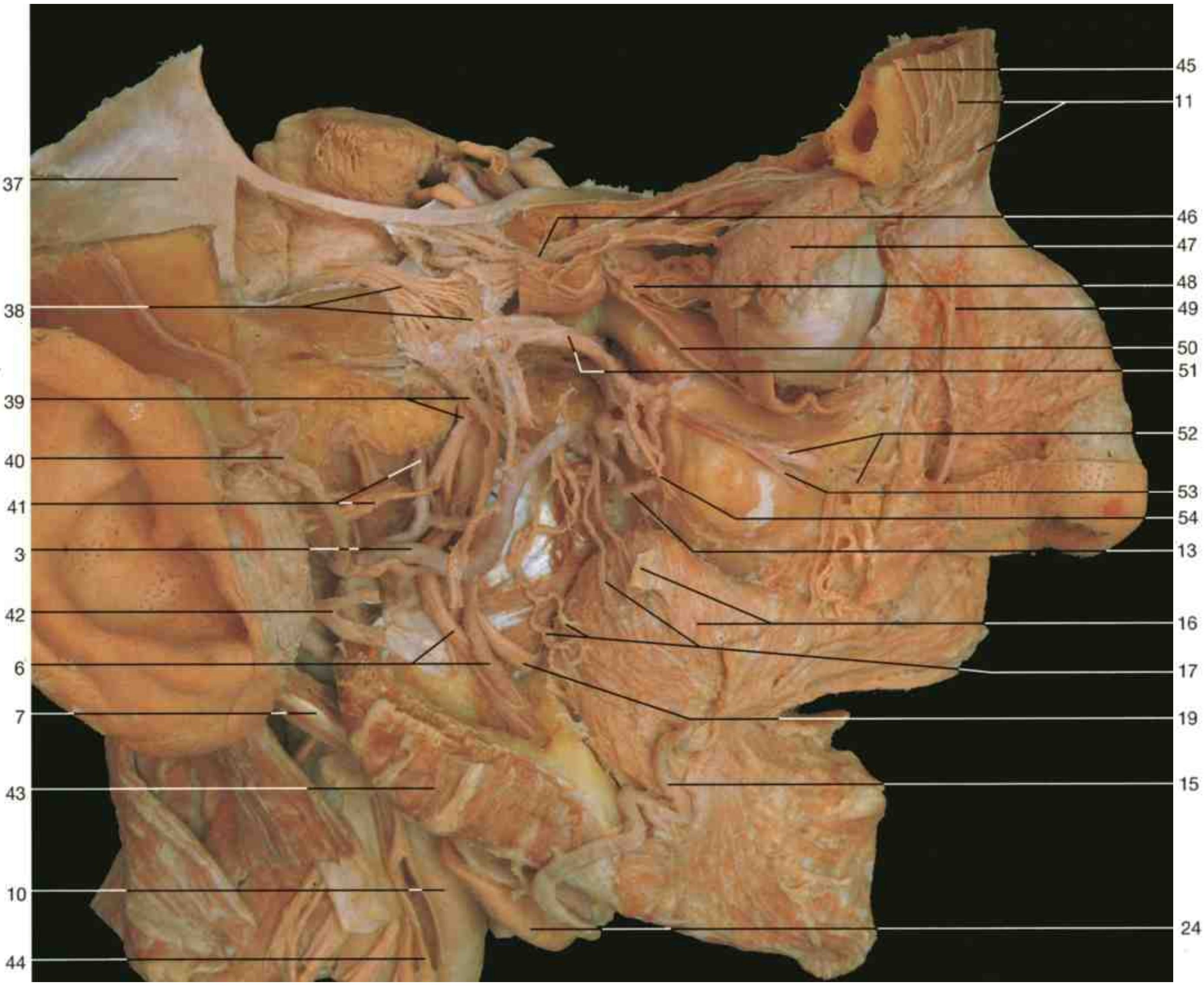


Dissection of deep facial and retromandibular regions after removal of mandible. Pteryogoid muscles removed, temporalis muscle fenestrated.



Transverse section through oral cavity and pharynx. The location of inferior alveolar nerve and artery is indicated by a needle.

1	Superficial temporal artery and vein and auriculotemporal nerve
2	Temporalis tendon, deep temporal nerves and artery
3	Maxillary artery
4	Middle meningeal artery
5	Occipital artery
6	Inferior alveolar artery and nerve
7	Posterior belly of digastric muscle
8	Great auricular nerve and sternocleidomastoid muscle
9	Hypoglossal nerve and superior root of ansa cervicalis
10	External carotid artery
11	Supratrochlear nerve and medial branch of supra-orbital artery
12	Angular artery
13	Posterior superior alveolar artery
14	Infra-orbital nerve
15	Facial artery
16	Parotid duct (divided) and buccinator muscle
17	Buccal artery and nerve

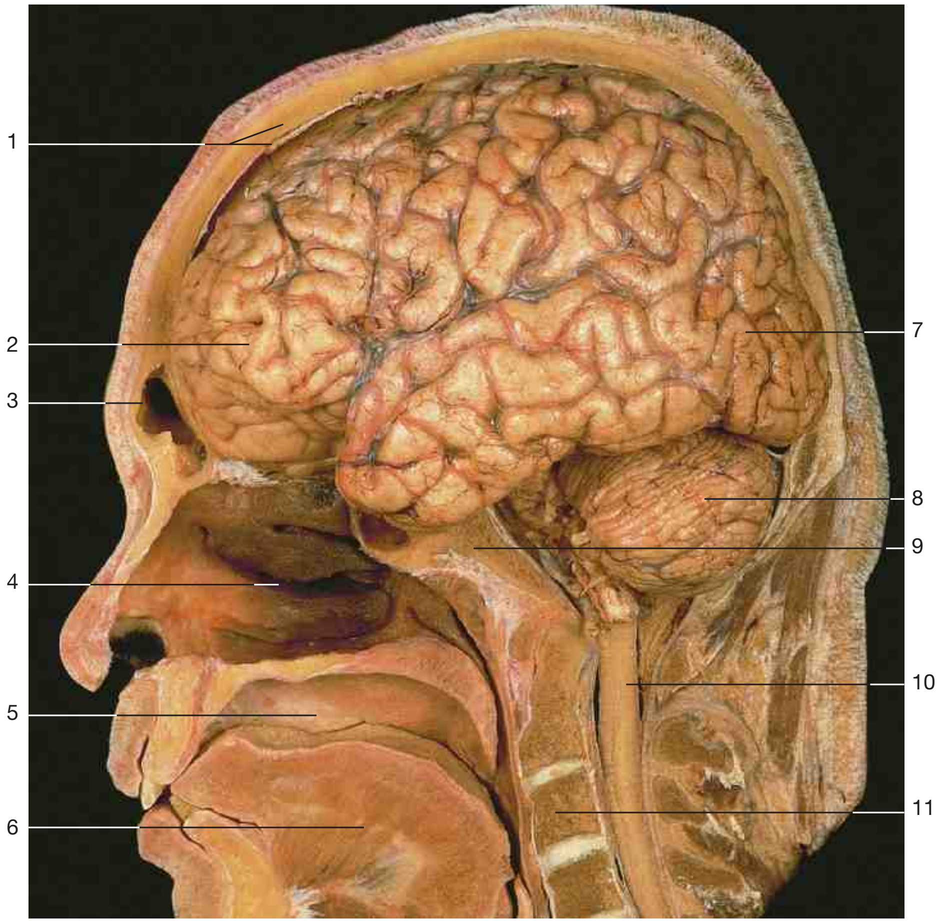


Para- and retropharyngeal regions. The mandible and the lateral wall of the orbit have been removed. The main branches of the trigeminal nerve and its ganglion are displayed.

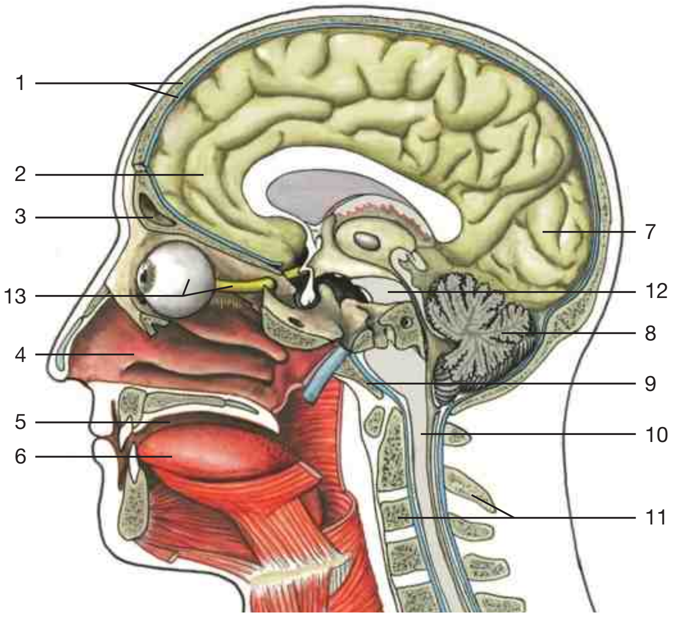
18 Mylohyoid nerve
19 Lingual nerve and submandibular ganglion
20 Mental nerve and mental foramen
21 Inferior alveolar nerve
22 Mylohyoid muscle (divided) and hypoglossal nerve
23 Submental artery and vein
24 Submandibular gland
25 Superior thyroid artery
26 Common carotid artery
27 Buccinator muscle
28 Masseter muscle and mandible
29 Entrance of mandibular canal
30 Medial pterygoid muscle
31 Palatine tonsil
32 Oral vestibule
33 Tongue
34 Inferior alveolar nerve, artery, and vein
35 Pharyngeal constrictor muscle
36 Pharynx
37 Tentorium of cerebellum
38 Trigeminal nerve and ganglion
39 Mandibular nerve
40 Superficial temporal artery
41 Auriculotemporal nerve and middle meningeal artery
42 Facial nerve (divided)
43 Masseter muscle
44 Superior root of ansa cervicalis
45 Lateral branch of supra-orbital nerve
46 Ophthalmic nerve
47 Lacrimal gland
48 Ciliary ganglion and short ciliary nerves
49 Angular artery
50 Inferior branch of oculomotor nerve
51 Maxillary nerve
52 Infra-orbital nerve
53 Anterior superior alveolar nerve
54 Posterior superior alveolar nerve

2.3 Brain and Sensory Organs

The cranial cavity harbours the brain, the cerebellum, and the brain stem from where the cranial nerves emerge and exit the skull through various openings and fissures. The great sensory organs are located within the orbit (eye), the nasal cavity (olfactory system), and the petrous portion of the temporal bone (vestibulocochlear organ). The brain is enwrapped by the pia mater containing the brain vessels. The dura mater is firmly attached to the skull and provides shelter and stabilization for the brain. Interposed between pia and dura mater lies the arachnoid containing the cerebrospinal fluid.

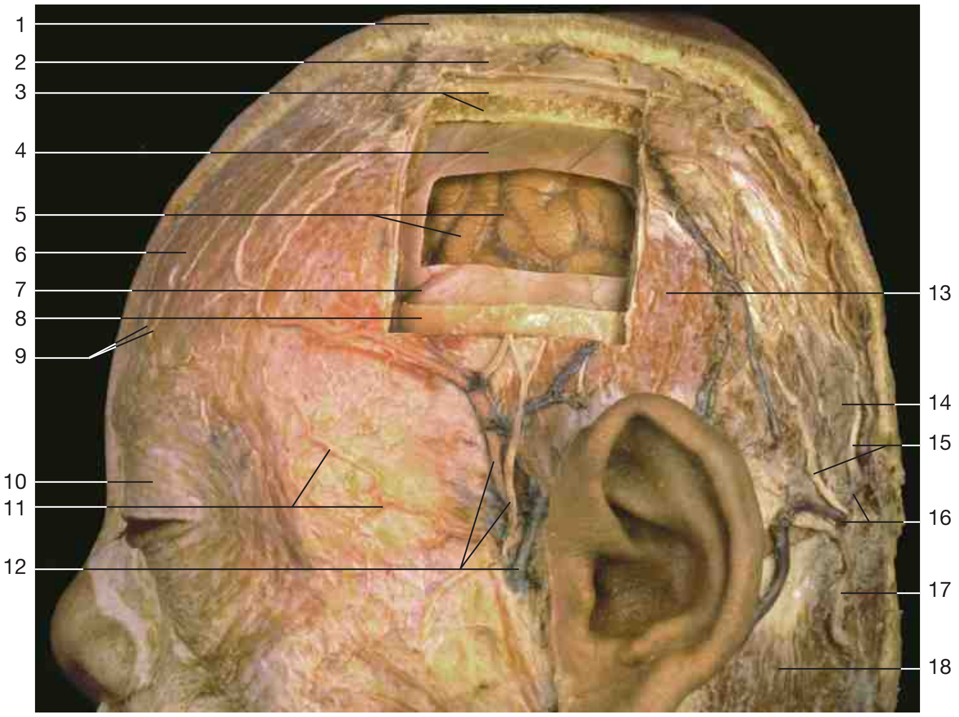


Dissection of the brain with pia mater and arachnoid in situ. The head is cut in half except for the brain, which is shown in its entirety.



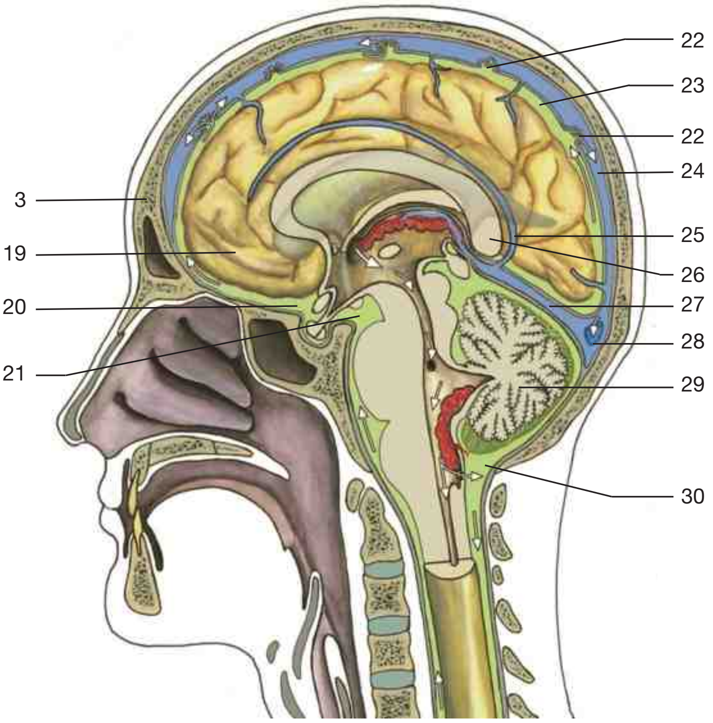
Sagittal section through the head with brain and sensory organs (schematic drawing). The eye with the optic nerve is located within the orbit; the labyrinth organ, within the petrous bone.

1	Vertex of the skull and dura mater
2	Frontal lobe covered by arachnoid and pia mater
3	Frontal sinus
4	Nasal cavity
5	Oral cavity
6	Tongue
7	Occipital lobe
8	Cerebellum
9	Base of skull
10	Spinal cord
11	Vertebral column
12	Brain stem
13	Eye and optic nerve (n. II)

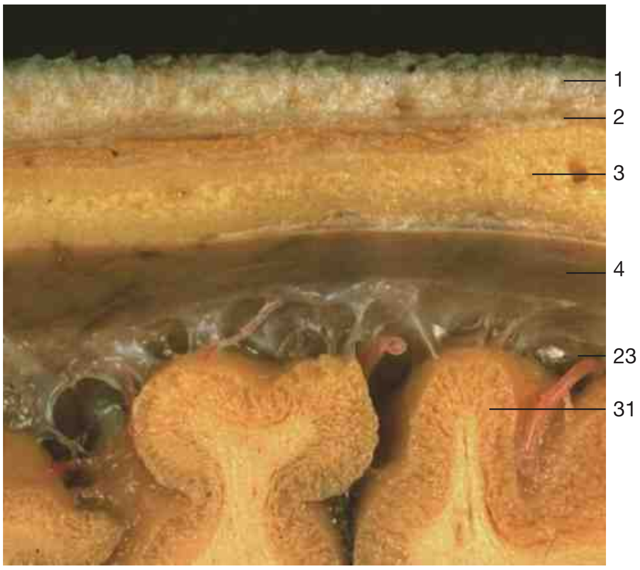


Lateral aspect of the head. Scalp, vertex of the skull, and meninges are demonstrated by a series of window-like openings.

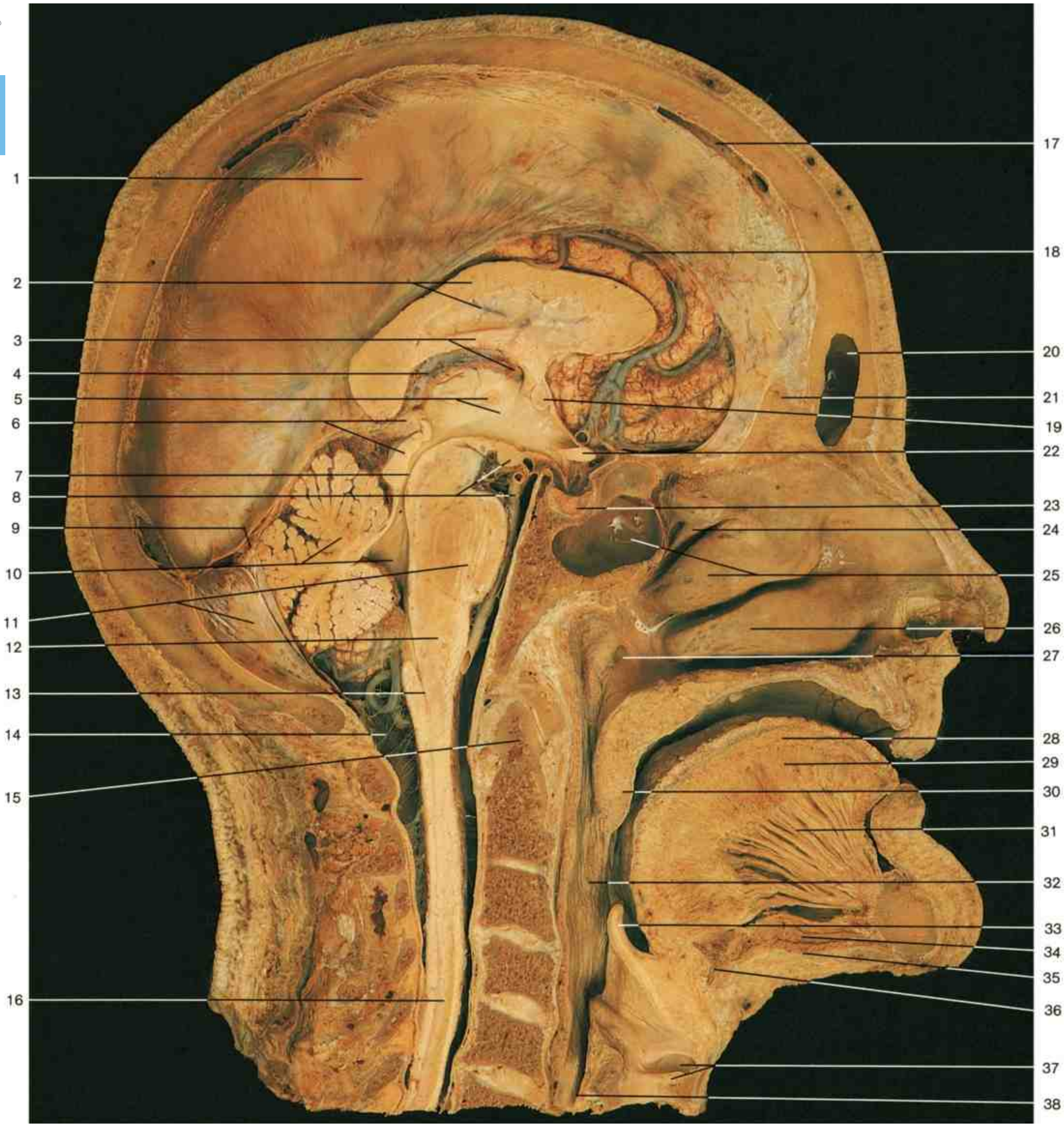
1 Skin
2 Galea aponeurotica
3 Skull diploe
4 Dura mater
5 Arachnoid and pia mater with cerebral vessels
6 Frontal belly of occipitofrontalis muscle
7 Branch of middle meningeal artery
8 Pericranium (periosteum)
9 Lateral and medial branches of supra-orbital nerve
10 Orbicularis oculi muscle
11 Zygomatico-orbital artery
12 Auriculotemporal nerve and superficial temporal artery and vein
13 Superior auricular muscle
14 Occipital belly of occipitofrontalis muscle
15 Occipital nerve
16 Occipital artery and vein
17 Greater occipital nerve
18 Sternocleidomastoid muscle
19 Frontal lobe
20 Chiasmatic cistern
21 Interpeduncular cistern
22 Arachnoid granulations
23 Subarachnoid space
24 Superior sagittal sinus
25 Inferior sagittal sinus
26 Corpus callosum
27 Straight sinus
28 Confluence of sinuses
29 Cerebellum
30 Cerebellomedullar cistern
31 Cerebral cortex



Subarachnoid cisterns of the brain (midsagittal section). Green = cisterns; blue = dural sinus and ventricles; red = choroid plexus of third and fourth ventricles; arrows = flow of cerebrospinal fluid.

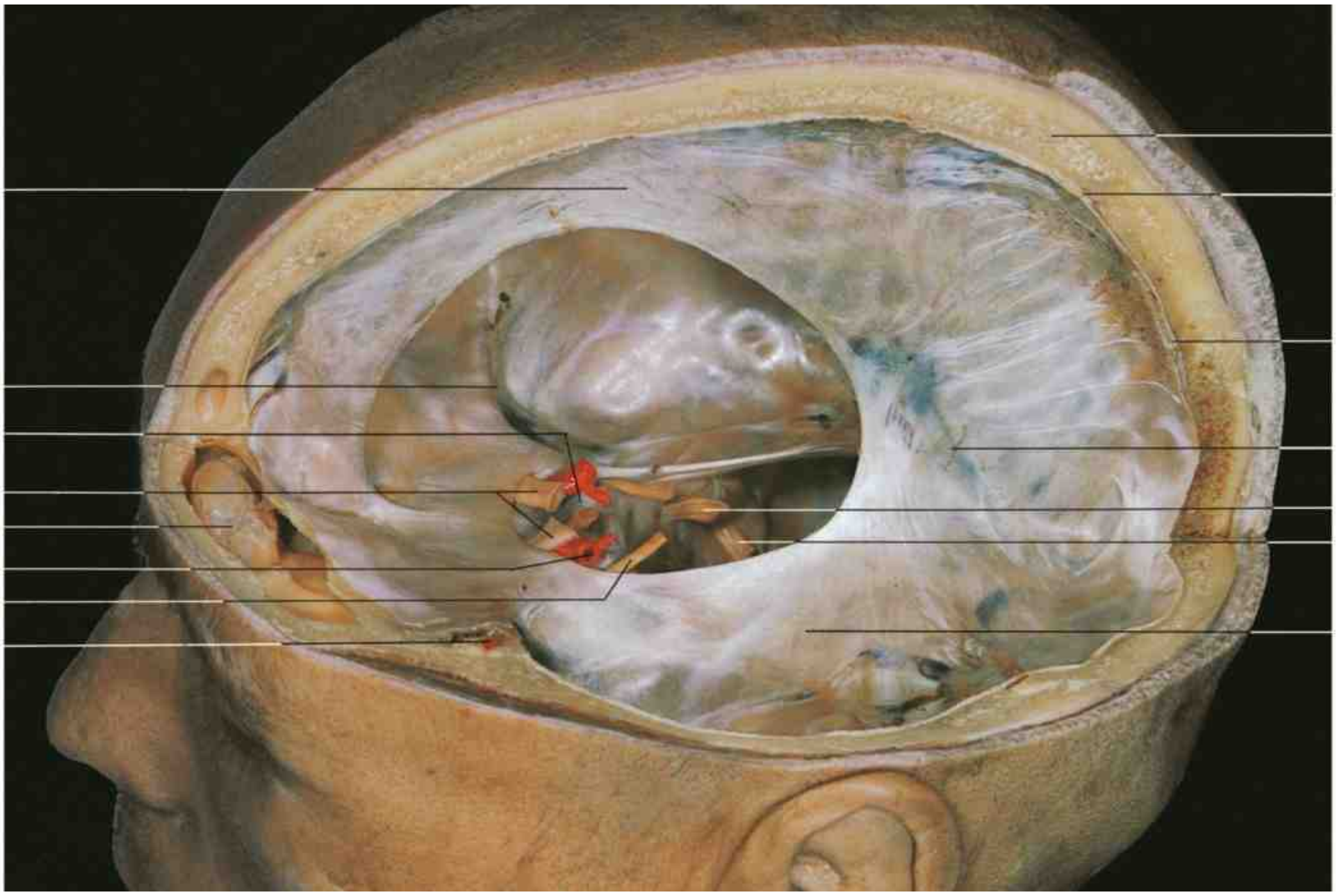


Cross section of the scalp and the meninges. The subarachnoid space (23) is shown.



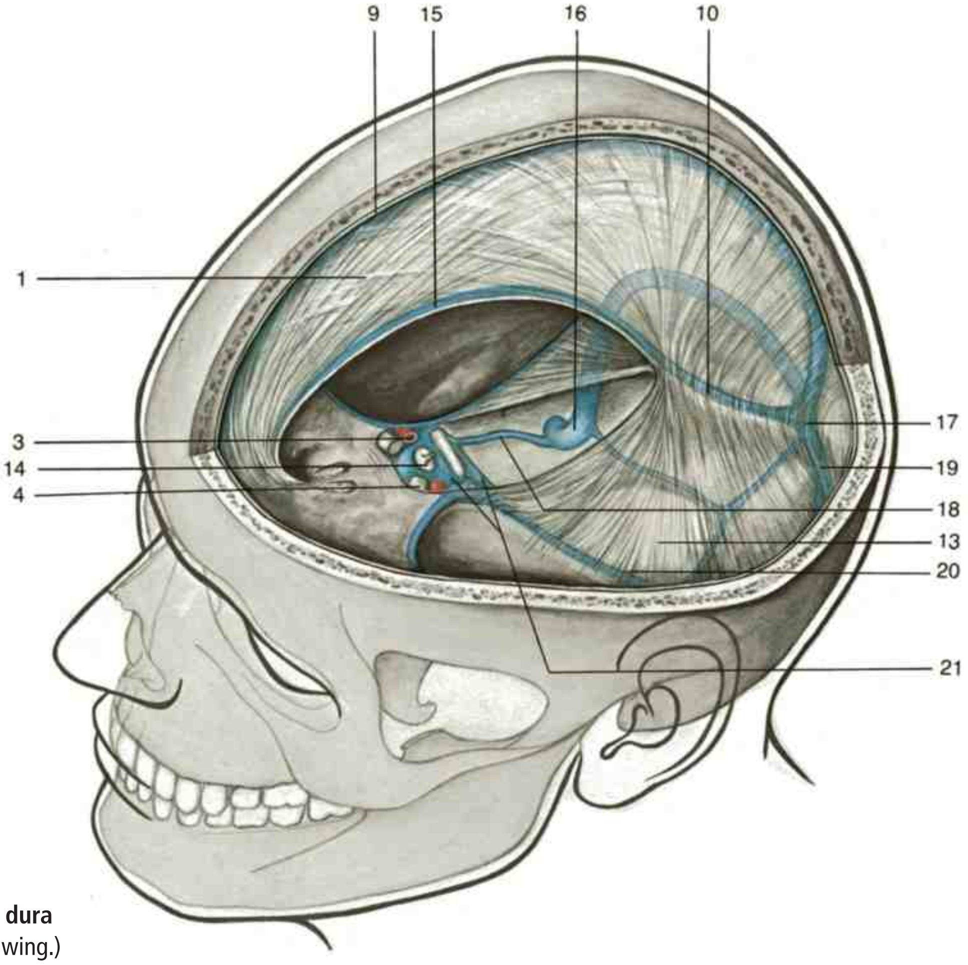
Median sagittal section through the head and neck.

1	Falx cerebri
2	Corpus callosum and septum pellucidum
3	Interventricular foramen and fornix
4	Choroid plexus of third ventricle and internal cerebral vein
5	Third ventricle and interthalamic adhesion
6	Pineal body and colliculi of the midbrain
7	Cerebral aqueduct
8	Mamillary body and basilar artery
9	Straight sinus
10	Fourth ventricle and cerebellum
11	Pons and falx cerebelli
12	Medulla oblongata
13	Central canal
14	Cerebellomedullary cistern
15	Dens of the axis (odontoid process)
16	Spinal cord
17	Superior sagittal sinus
18	Anterior cerebral artery
19	Anterior commissure
20	Frontal sinus
21	Crista galli
22	Optic chiasma
23	Pituitary gland (hypophysis)
24	Superior nasal concha
25	Middle nasal concha and sphenoid sinus
26	Inferior nasal concha
27	Pharyngeal opening of auditory tube
28	Superior longitudinal muscle of tongue
29	Vertical muscle of the tongue
30	Uvula
31	Genioglossus muscle
32	Pharynx
33	Epiglottis
34	Geniohyoid muscle
35	Mylohyoid muscle
36	Hyoid bone
37	Vocal fold and sinus of larynx
38	Esophagus

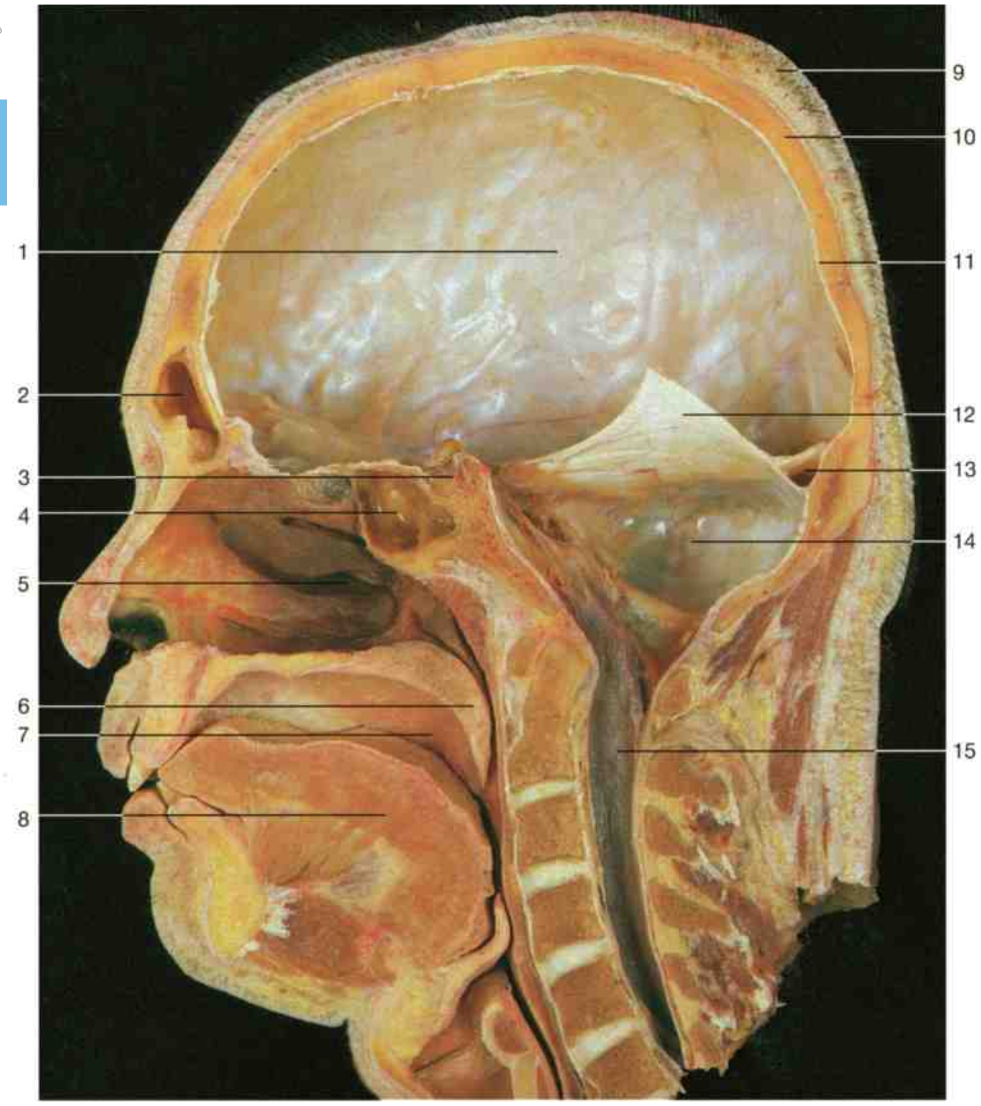


Dura mater and venous sinuses of the dura mater. The brain has been removed (oblique lateral aspect).

1 Falx cerebri
2 Position of middle meningeal artery and vein
3 Internal carotid artery
4 Optic nerve (n. II)
5 Frontal sinus
6 Oculomotor nerve (n. III)
7 Diploe
8 Dura mater
9 Superior sagittal sinus
10 Straight sinus
11 Trigeminal nerve (n. V)
12 Facial and vestibulocochlear nerve (n. VII and n. VIII)
13 Tentorium cerebelli
14 Pituitary gland (hypophysis)
15 Inferior sagittal sinus
16 Sigmoid sinus
17 Confluence of sinuses
18 Inferior petrosal sinus
19 Transverse sinus
20 Superior petrosal sinus
21 Cavernous and intercavernous sinuses

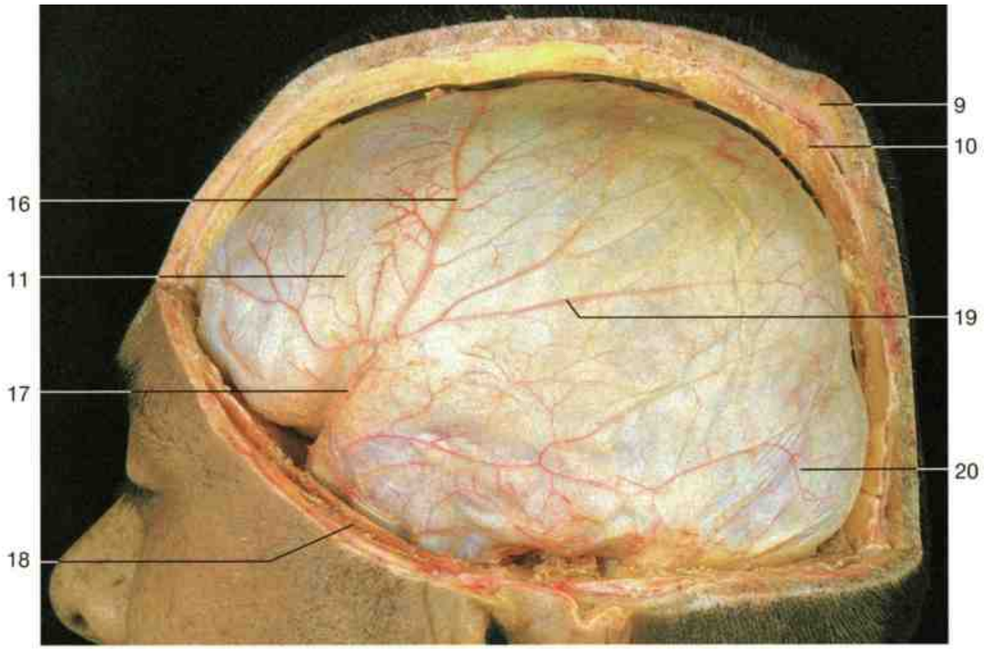


Dura mater and venous sinuses of the dura mater (left lateral aspect). (Schematic drawing.)

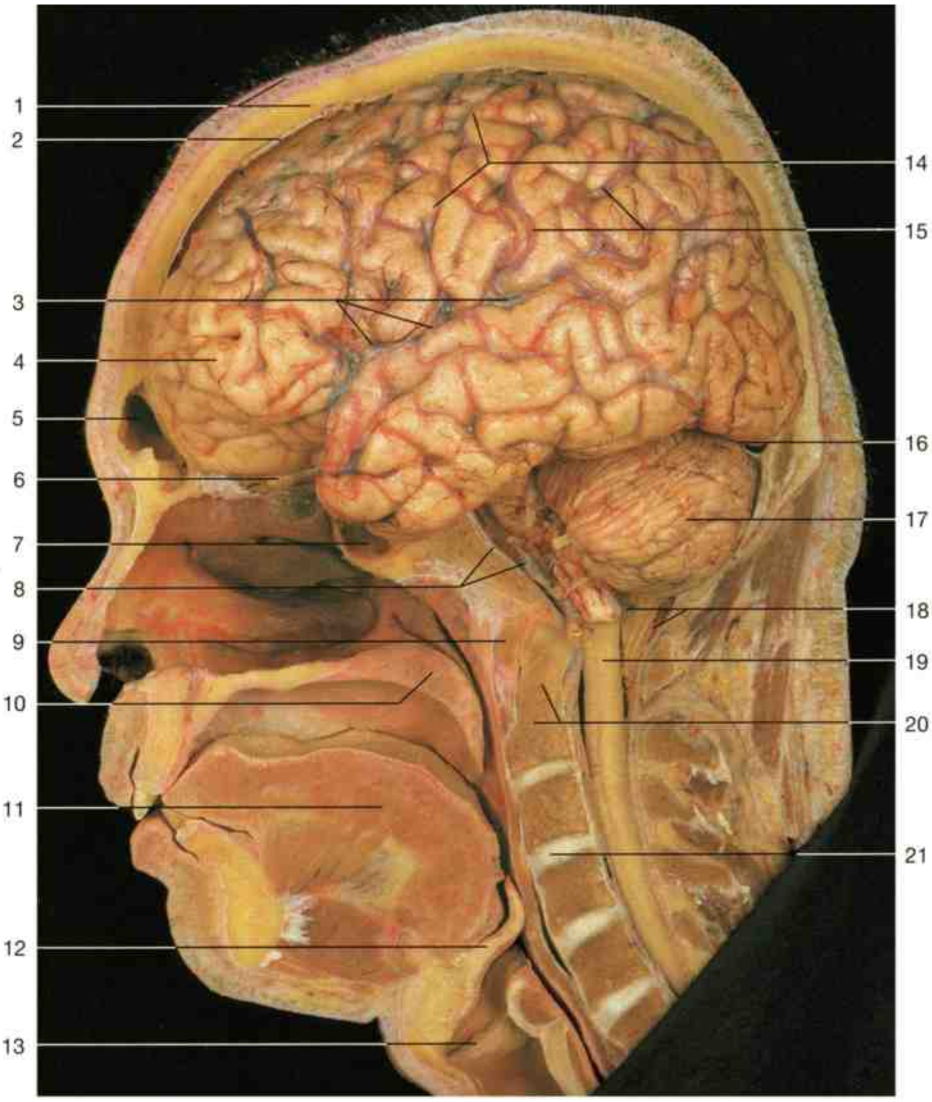


Median section through the head. Demonstration of dura mater covering the cranial cavity. Brain and spinal cord are removed (right half of the head, as seen from medial).

1 Cranial cavity with dura mater (right cerebral hemisphere has been removed)
2 Frontal sinus
3 Hypophysial fossa with pituitary gland
4 Sphenoidal sinus
5 Nasal cavity
6 Soft palate (uvula)
7 Oral cavity
8 Tongue
9 Skin
10 Calvaria
11 Dura mater
12 Tentorium cerebelli
13 Confluence of sinuses
14 Infratentorial space (cerebellum and part of the brain stem have been removed)
15 Vertebral canal
16 Frontal branch of middle meningeal artery and veins
17 Middle meningeal artery
18 Diploe
19 Parietal branch of middle meningeal artery and vein
20 Occipital pole of left hemisphere covered with dura mater

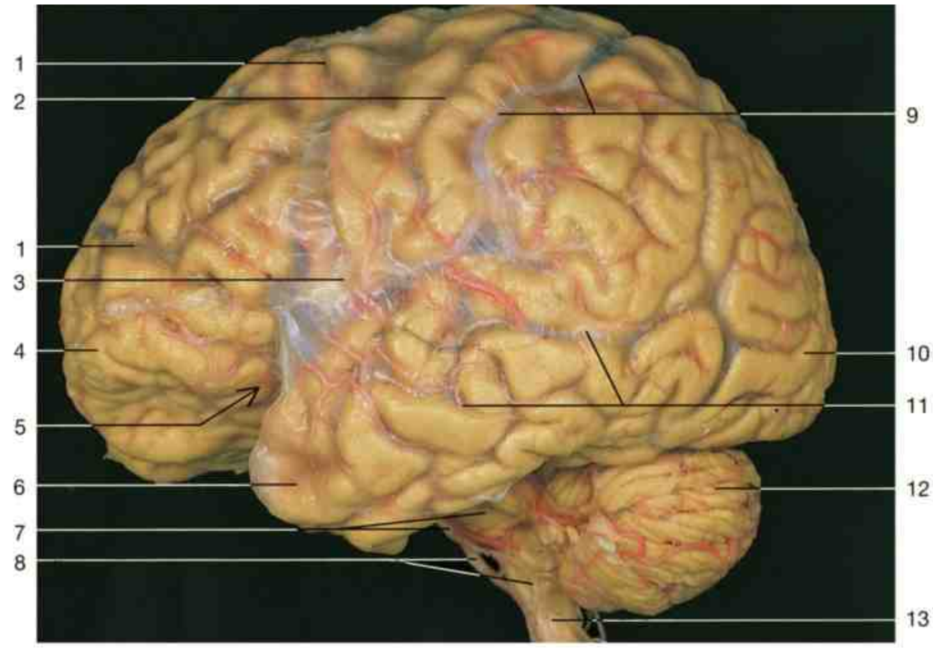


Dissection of dura mater and meningeal vessels. Left half of calvaria removed.



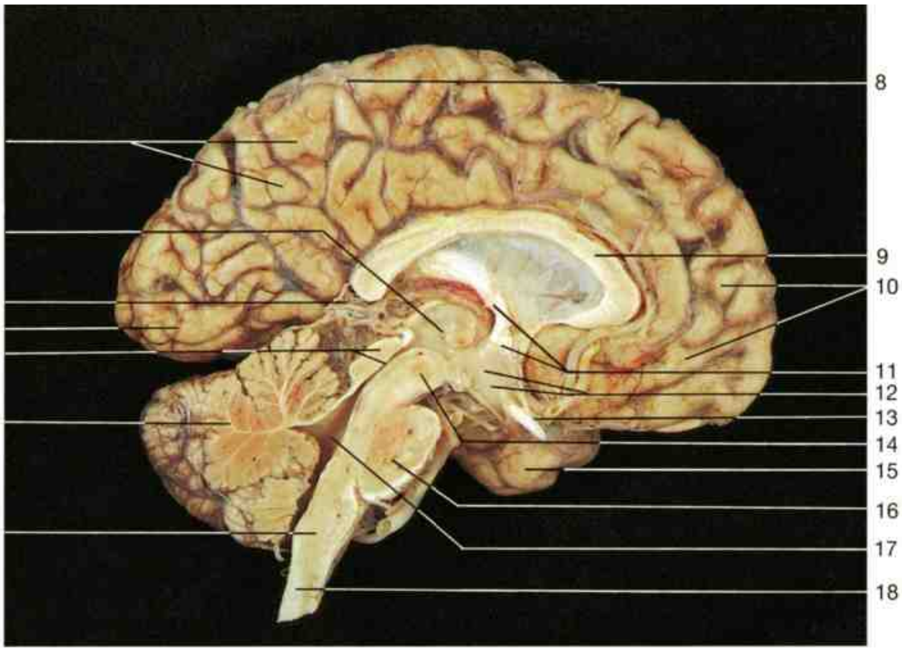
1 Calvaria and skin of the scalp
2 Dura mater (divided)
3 Position of lateral sulcus
4 Frontal lobe covered by arachnoid and pia mater
5 Frontal sinus
6 Olfactory bulb
7 Sphenoidal sinus
8 Dura mater on clivus and basilar artery
9 Atlas (anterior arch, divided)
10 Soft palate
11 Tongue
12 Epiglottis
13 Vocal fold
14 Position of central sulcus
15 Superior cerebral veins
16 Tentorium (divided)
17 Cerebellum
18 Cerebellomedullary cistern
19 Position of foramen magnum and spinal cord
20 Dens of axis
21 Intervertebral disc

Dissection of the brain with pia mater and arachnoid in situ. The head is cut in half except for the brain, which is shown in its entirety.



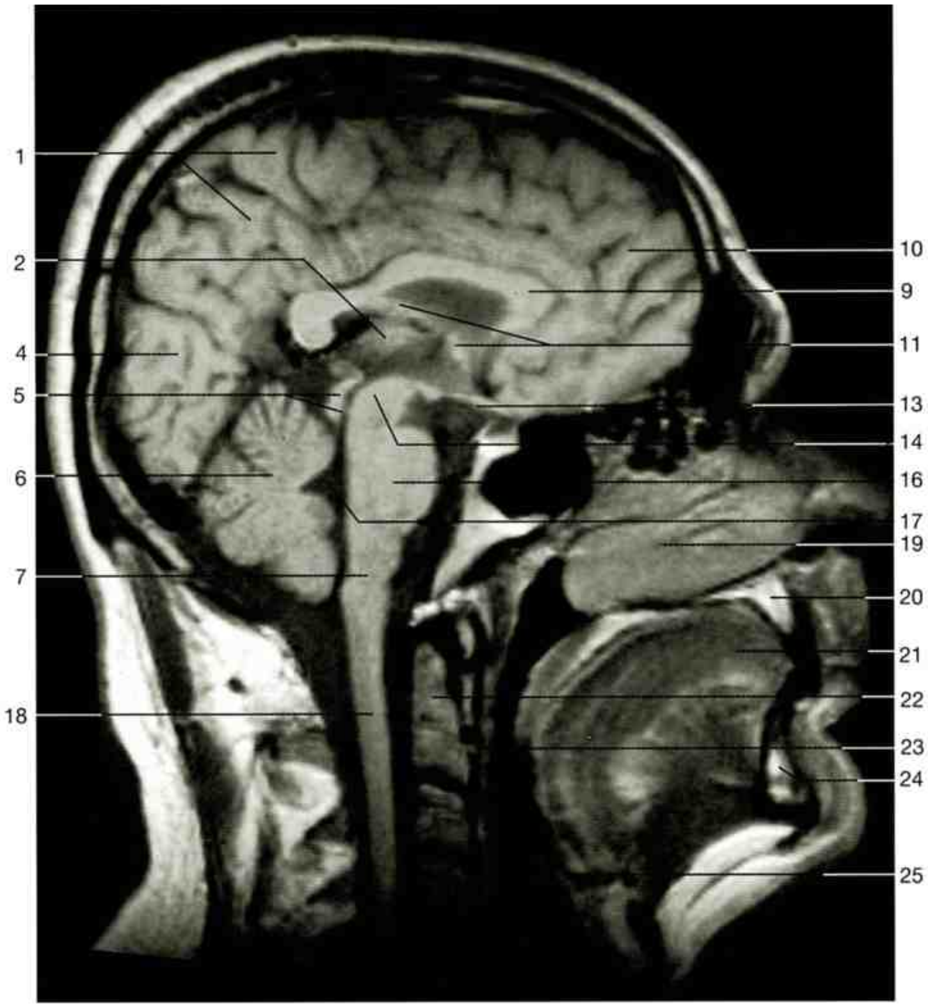
1 Superior cerebral veins
2 Position of central sulcus
3 Position of lateral sulcus and cistern of lateral cerebral fossa
4 Frontal pole
5 Lateral sulcus (arrow)
6 Temporal pole
7 Pons and basilar artery
8 Vertebral arteries
9 Superior anastomotic vein
10 Occipital pole
11 Inferior cerebral veins
12 Hemisphere of cerebellum
13 Medulla oblongata

Brain with pia mater and arachnoid. Frontal pole to the left (lateral aspect).

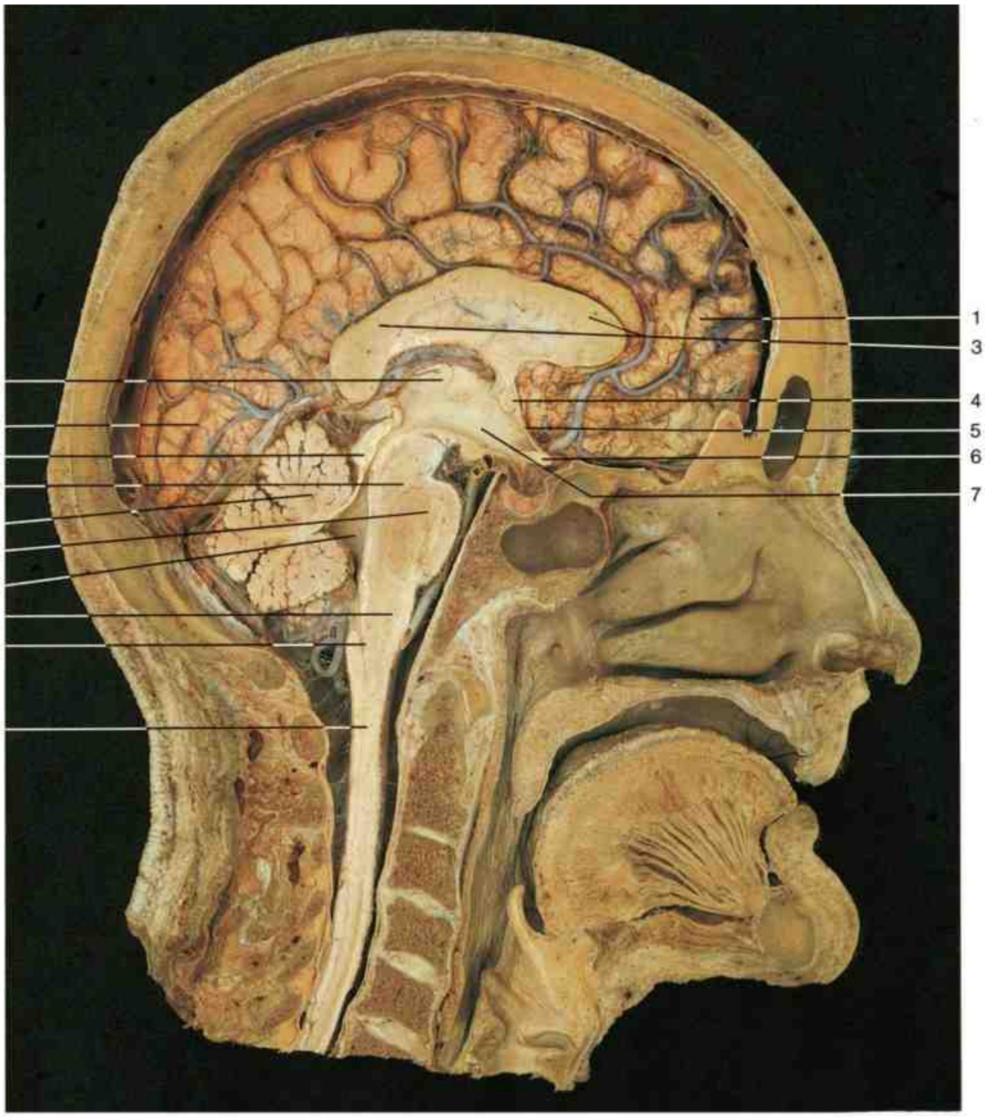


Brain and brain stem, median section. Frontal pole to the right.

1 Parietal lobe
2 Thalamus, third ventricle, and intermediate mass
3 Great cerebral vein
4 Occipital lobe
5 Colliculi of the midbrain and cerebral aqueduct
6 Cerebellum
7 Medulla oblongata
8 Central sulcus
9 Corpus callosum
10 Frontal lobe
11 Fornix and anterior commissure
12 Hypothalamus
13 Optic chiasma
14 Midbrain
15 Temporal lobe
16 Pons
17 Fourth ventricle
18 Spinal cord
19 Inferior concha and nasal cavity
20 Alveolar process of maxilla
21 Tongue
22 Dens of axis
23 Oral part of pharynx
24 Alveolar process of mandible
25 Epiglottis

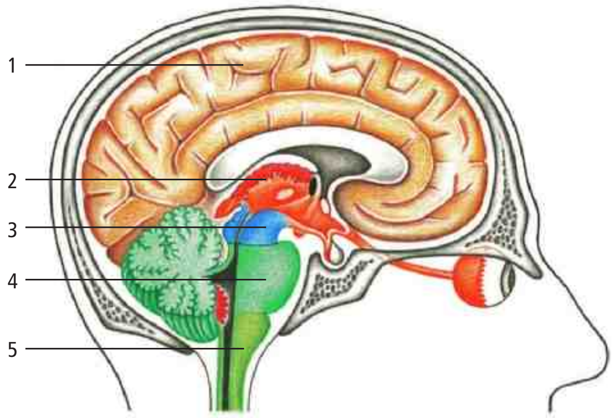


Median section through the head. (MRI scan, cf. section on opposite page.)



1 Frontal lobe of cerebrum
2 Occipital lobe of cerebrum
3 Corpus callosum
4 Anterior commissure
5 Lamina terminalis
6 Optic chiasma
7 Hypothalamus
8 Thalamus and third ventricle
9 Colliculi of the midbrain
10 Midbrain (inferior portion)
11 Cerebellum
12 Pons
13 Fourth ventricle
14 Medulla oblongata
15 Central canal
16 Spinal cord

Median section through the head. Regions of the brain. Falx cerebri removed.



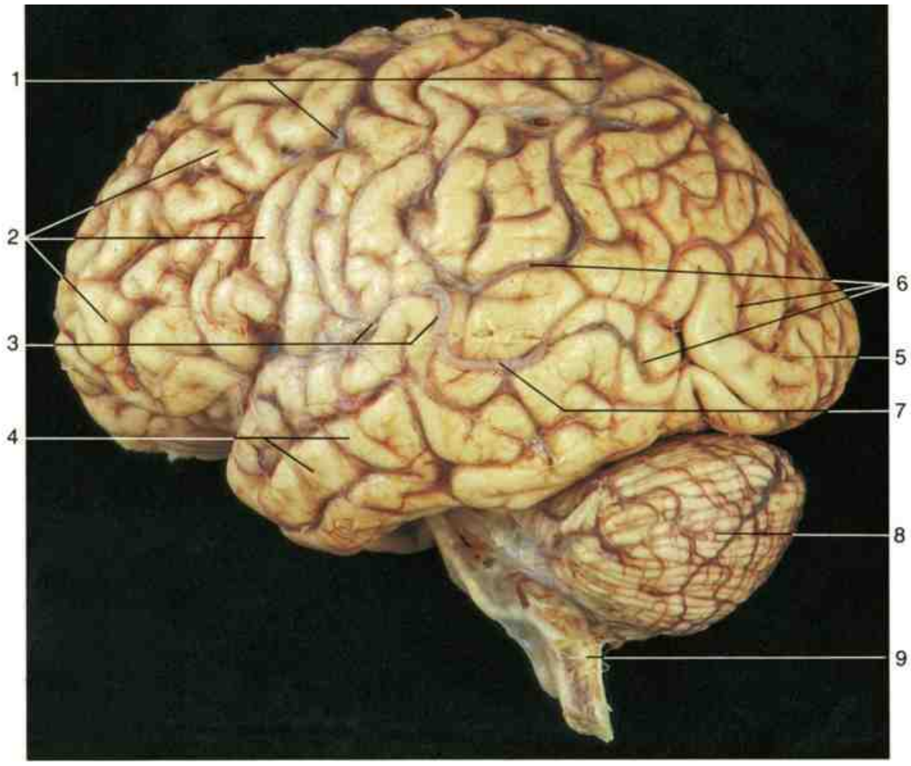
Scheme of brain divisions (cf. table). (Schematic drawing.) Red = choroidal plexus.

1 Telencephalon (yellow) with lateral ventricles
2 Diencephalon (orange) with third ventricle, optic nerve, and retina
3 Mesencephalon (blue) with cerebral aqueduct
4 Metencephalon (green) with fourth ventricle
5 Myelencephalon (yellow-green)

I. Prosencephalon (forebrain)	1. Telencephalon (cerebral hemispheres, striatum, etc.) 2. Diencephalon (thalamus, metathalamus, hypothalamus, etc.)
II. Mesencephalon (midbrain)	3. Mesencephalon (colliculi, cerebral peduncles, tegmentum)
III. Rhombencephalon (hindbrain)	4. Metencephalon (pons, cerebellum) 5. Myelencephalon (medulla oblongata)

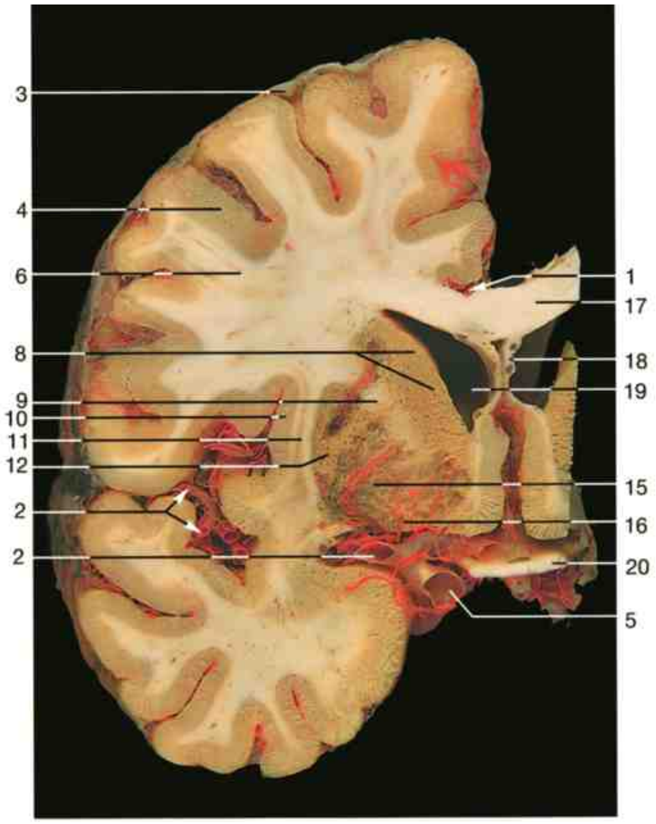
Main divisions of the brain
I–III = primary brain vesicles; 1–5 = secondary brain vesicles

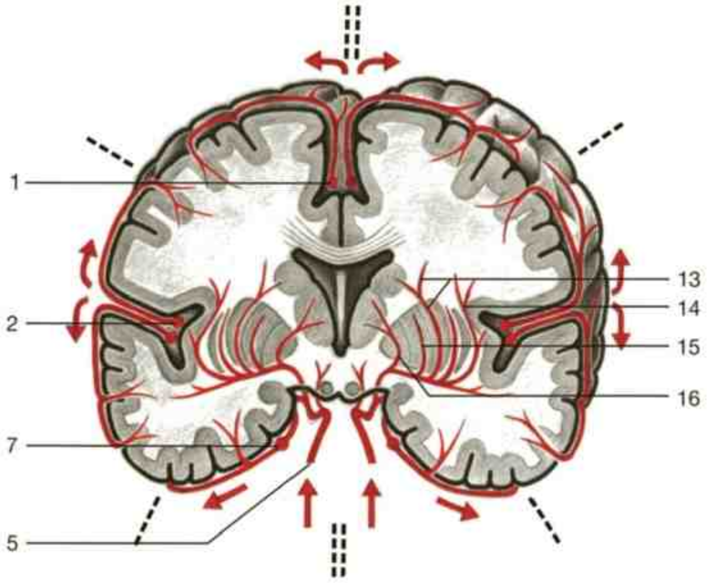
Diencephalon, midbrain, pons, and medulla oblongata are collectively termed the **brain stem.**



1 Superior cerebral veins and parietal lobe
2 Frontal lobe
3 Superficial middle cerebral vein and cistern of lateral cerebral fossa
4 Temporal lobe
5 Occipital lobe
6 Inferior cerebral veins and transverse occipital sulcus
7 Inferior anastomotic vein
8 Cerebellum
9 Medulla oblongata

Brain with pia mater. Cerebral veins (bluish). In the lateral sulcus the cistern of the lateral fossa is recognizable. Frontal lobe to the left.

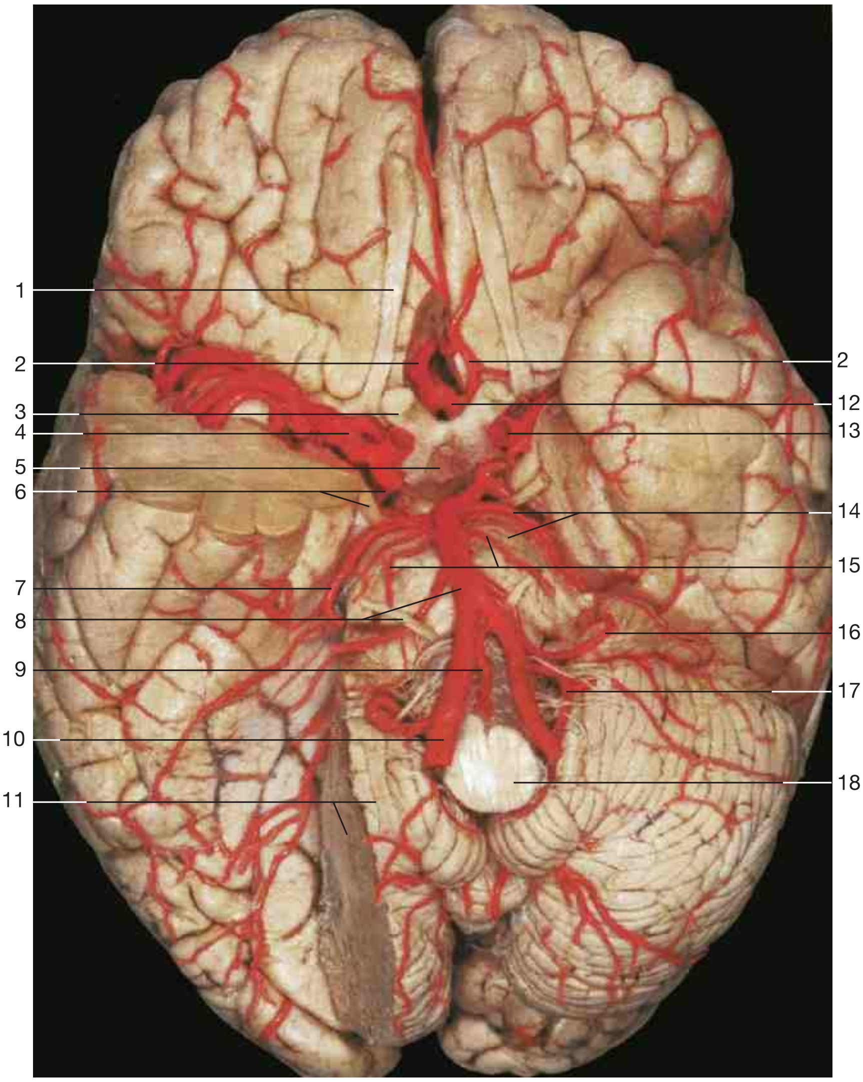




Arteries of the brain. Coronal section. Areas supplied by cortical and central arteries. Dotted lines indicate boundaries of arterial supply areas; arrows = direction of blood flow.

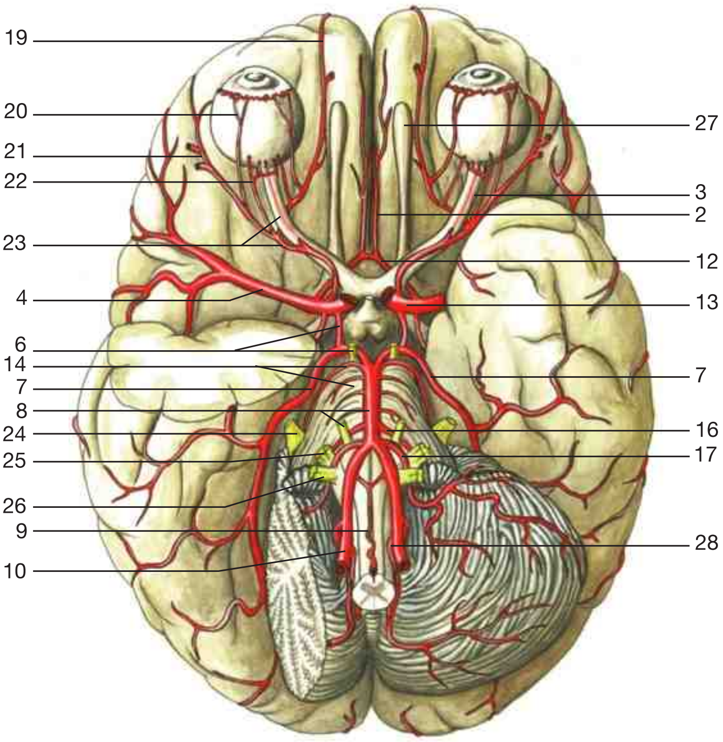
◁ **Coronal section through the right hemisphere,** showing arachnoid, pia mater, and the arterial blood supply (anterior aspect).

1 Anterior cerebral artery
2 Middle cerebral arteries
3 Arachnoid
4 Cortex
5 Internal carotid artery
6 Frontal lobe (white matter)
7 Posterior cerebral artery
8 Caudate nucleus
9 Internal capsule
10 Insular lobe
11 Claustrum
12 Putamen
13 Posterior striate branch
14 Insular artery
15 Pallidostriate artery
16 Thalamic artery
17 Corpus callosum
18 Septum pellucidum
19 Lateral ventricle
20 Optic chiasma

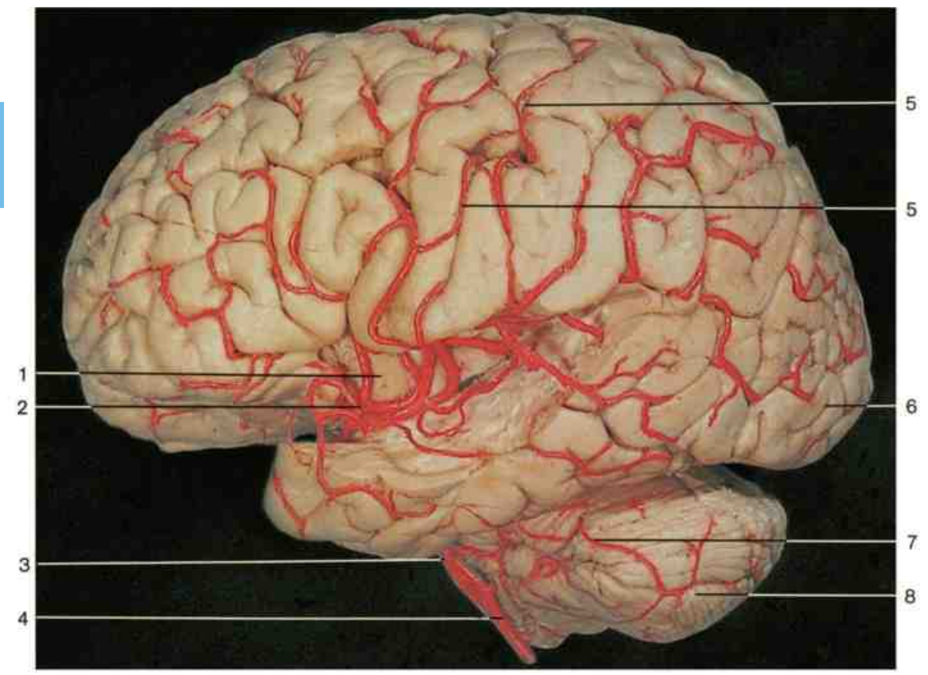


Arteries of the brain (inferior aspect, frontal pole above). Right temporal lobe and cerebellum partly removed.

1 Olfactory tract
2 Anterior cerebral artery
3 Optic nerve (n. II)
4 Middle cerebral artery
5 Infundibulum
6 Oculomotor nerve (n. III) and posterior communicating artery
7 Posterior cerebral artery
8 Basilar artery and abducent nerve (n. VI)
9 Anterior spinal artery
10 Vertebral artery
11 Cerebellum
12 Anterior communicating artery
13 Internal carotid artery
14 Superior cerebellar artery and pons
15 Labyrinthine arteries
16 Inferior anterior cerebellar artery
17 Inferior posterior cerebellar artery
18 Medulla oblongata
19 Supratrochlear artery
20 Anterior ciliary arteries
21 Lacrimal artery
22 Posterior ciliary arteries
23 Ophthalmic artery with central retinal artery
24 Trigeminal nerve (n. V)
25 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
26 Glossopharyngeal nerve (n. IX), vagus nerve (n. X), and accessory nerve (n. XI)
27 Olfactory bulb
28 Posterior spinal artery

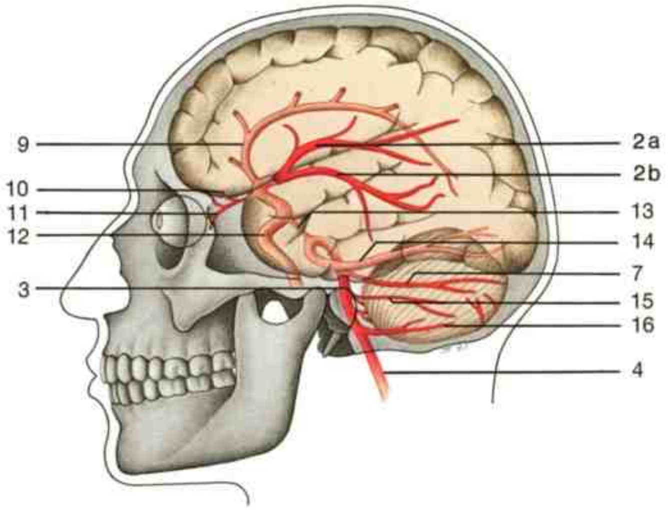


Arteries of the brain (inferior aspect). Right temporal lobe and cerebellum partly removed. Note the arterial circle of Willis around the infundibulum.

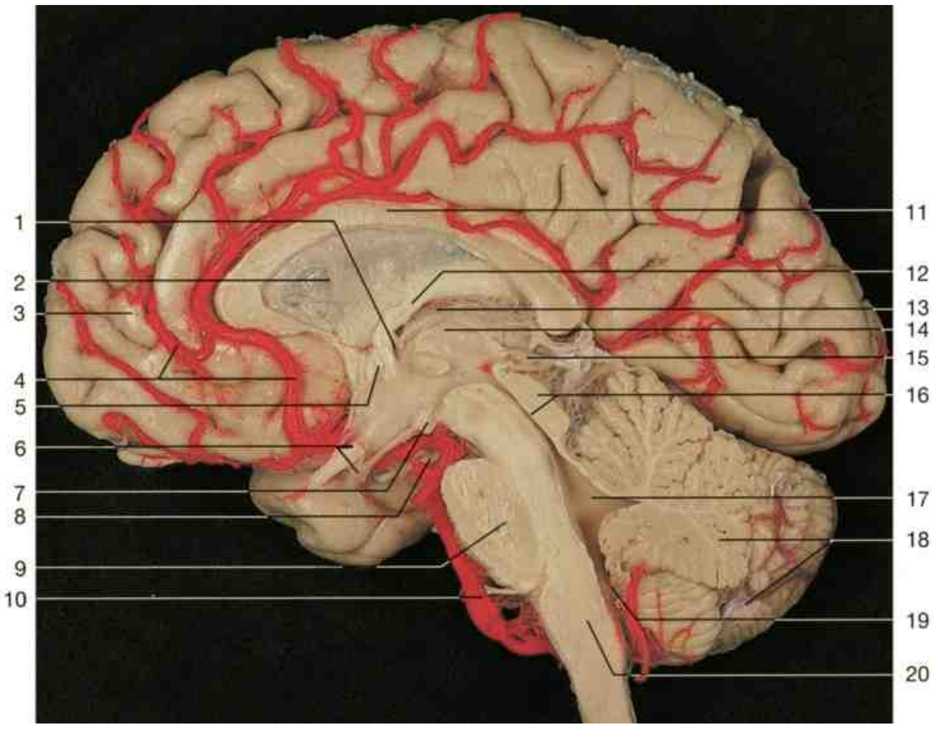


1 Insula
2 Middle cerebral artery (2 branches:
  a Parietal branches,
  b Temporal branches)
3 Basilar artery
4 Vertebral artery
5 Central sulcus
6 Occipital lobe
7 Superior cerebellar artery
8 Cerebellum
9 Anterior cerebral artery
10 Ethmoidal arteries
11 Ophthalmic artery
12 Internal carotid artery
13 Posterior communicating artery
14 Posterior cerebral artery
15 Anterior inferior cerebellar artery
16 Posterior inferior cerebellar artery

Cerebral arteries. Lateral aspect of the left hemisphere. The upper part of the temporal lobe has removed to display the insula and cerebral arteries.

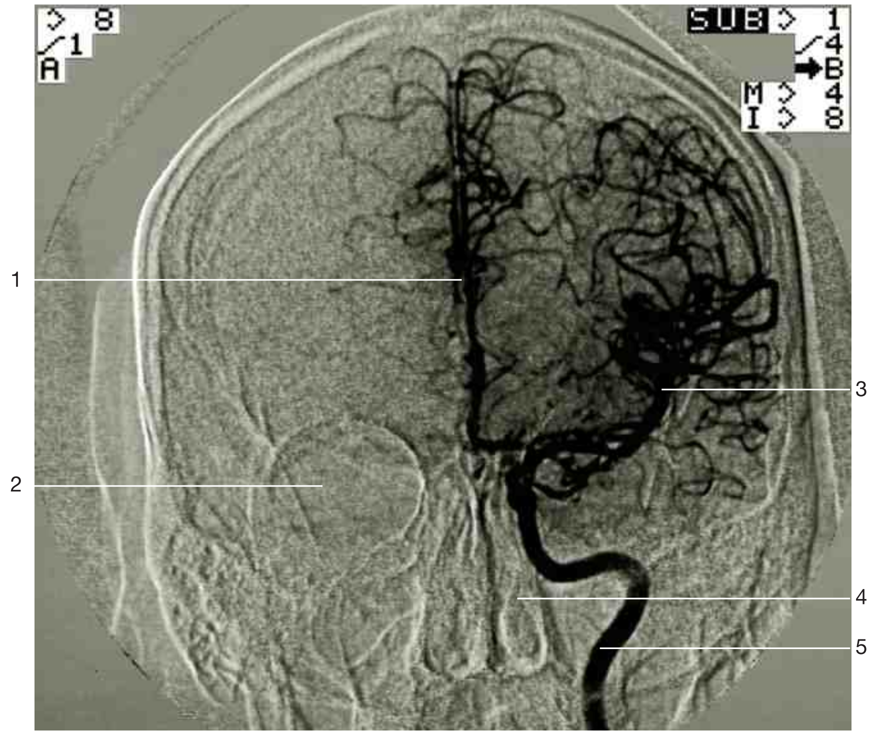


◁ **Arteries of the brain.**



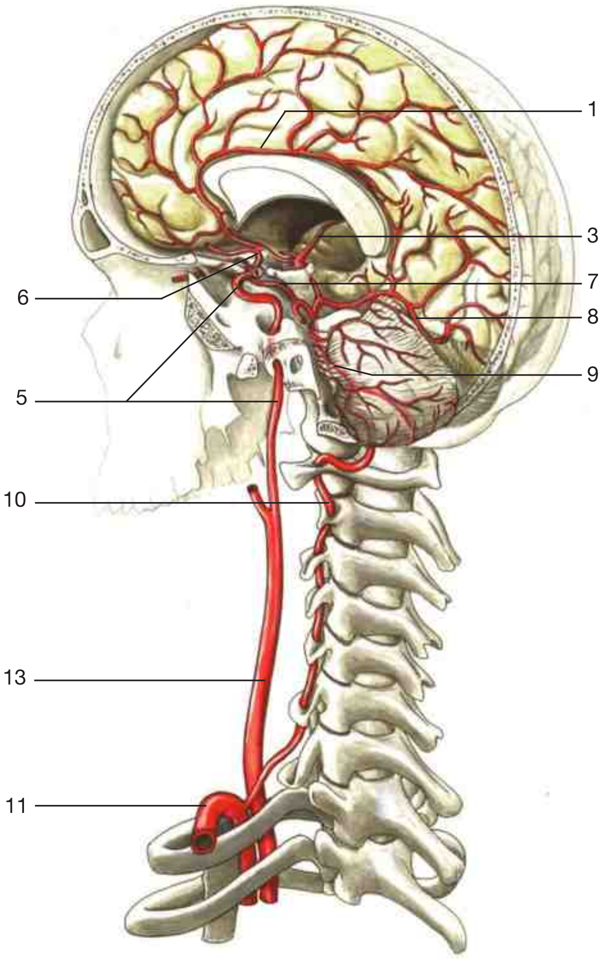
1 Interventricular foramen
2 Septum pellucidum
3 Frontal lobe
4 Anterior cerebral artery
5 Anterior commissure
6 Optic chiasma and infundibulum
7 Mamillary body
8 Oculomotor nerve (n. III)
9 Pons
10 Basilar artery
11 Corpus callosum
12 Fornix
13 Choroid plexus
14 Third ventricle
15 Pineal body
16 Tectum and cerebral aqueduct
17 Fourth ventricle
18 Cerebellum (arbor vitae, vermis)
19 Median aperture of Magendie
20 Medulla oblongata

Median section through the brain and brain stem. Cerebral arteries injected with red resin.

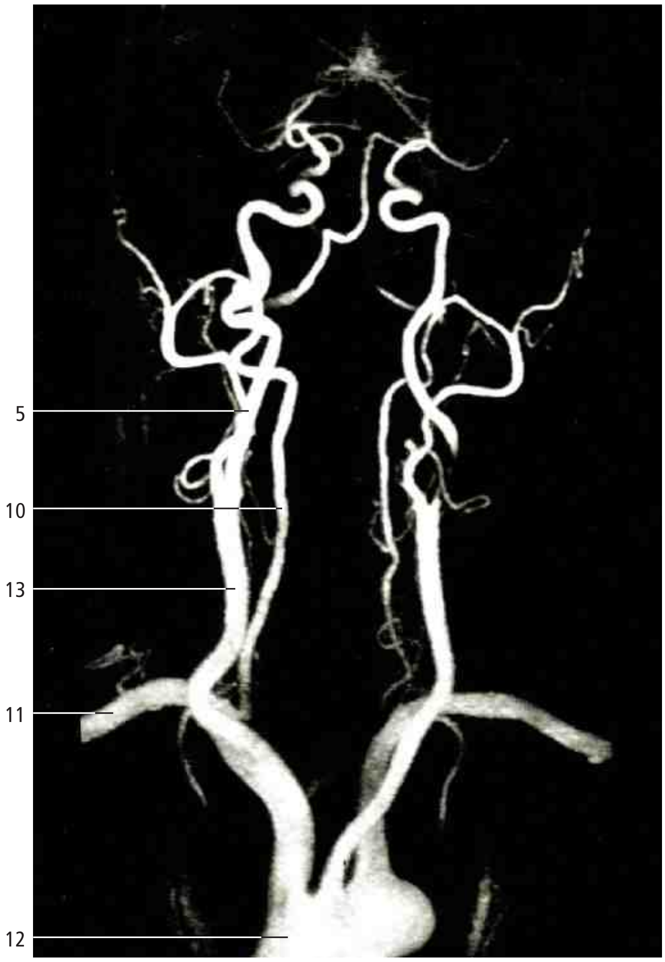


Arteries of the brain. Angiogram of the internal carotid artery (anterior aspect) (courtesy of Prof. Dr. W. Huk, University of Erlangen-Nürnberg).

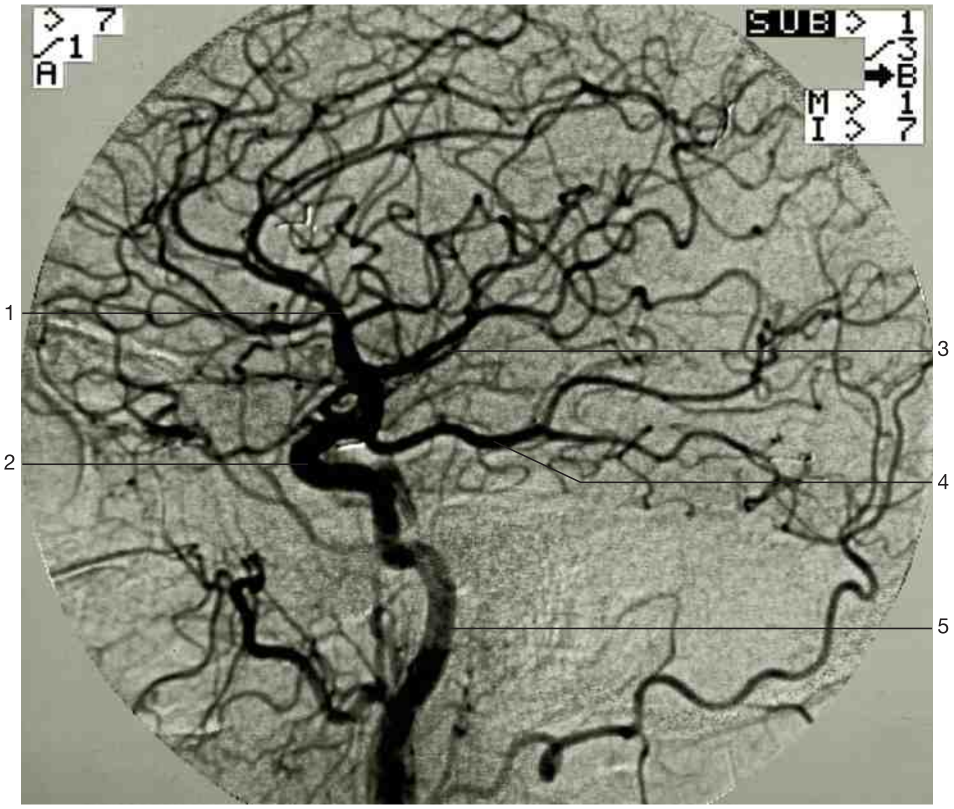
1	Anterior cerebral artery
2	Orbit
3	Middle cerebral artery
4	Nasal cavity
5	Internal carotid artery
6	Arterial circle of Willis
7	Posterior communicating artery
8	Posterior cerebral artery
9	Basilar artery
10	Vertebral artery
11	Subclavian artery
12	Aortic arch
13	Common carotid artery



Cerebral arteries (schematic drawing).
Left hemisphere and brain stem have been removed.
Note the arterial circle of Willis around the sella turcica.

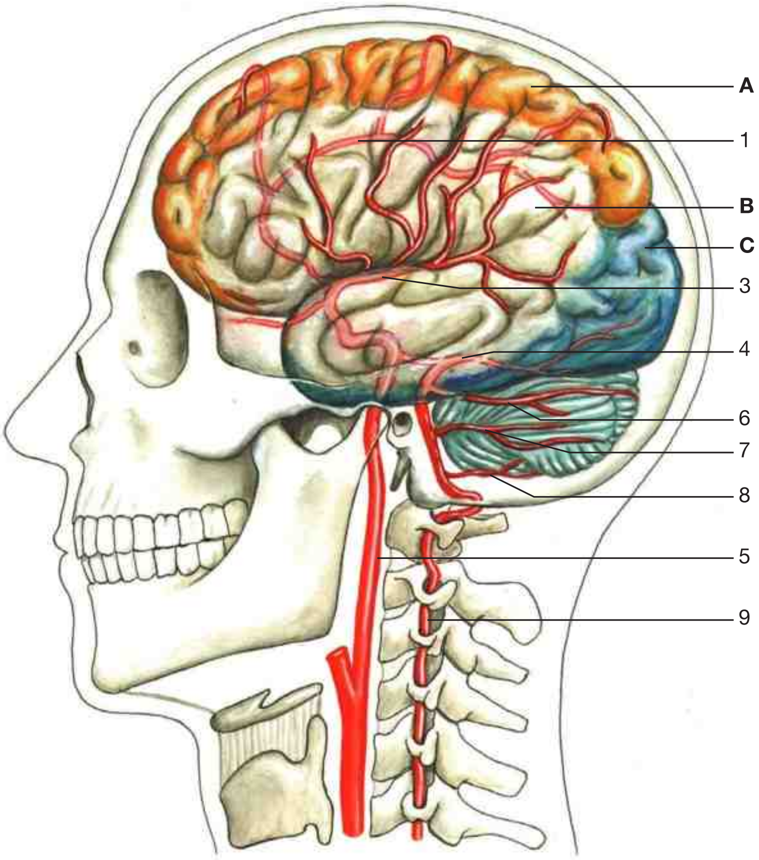


Main arteries for brain supply (MRI angiograph, anterior aspect, courtesy of Prof. Dr. W. Bautz, University of Erlangen-Nürnberg).



Arteries of the brain. Angiogram of the internal carotid artery (lateral aspect) (courtesy of Prof. Dr. W. Huk, University of Erlangen-Nürnberg).

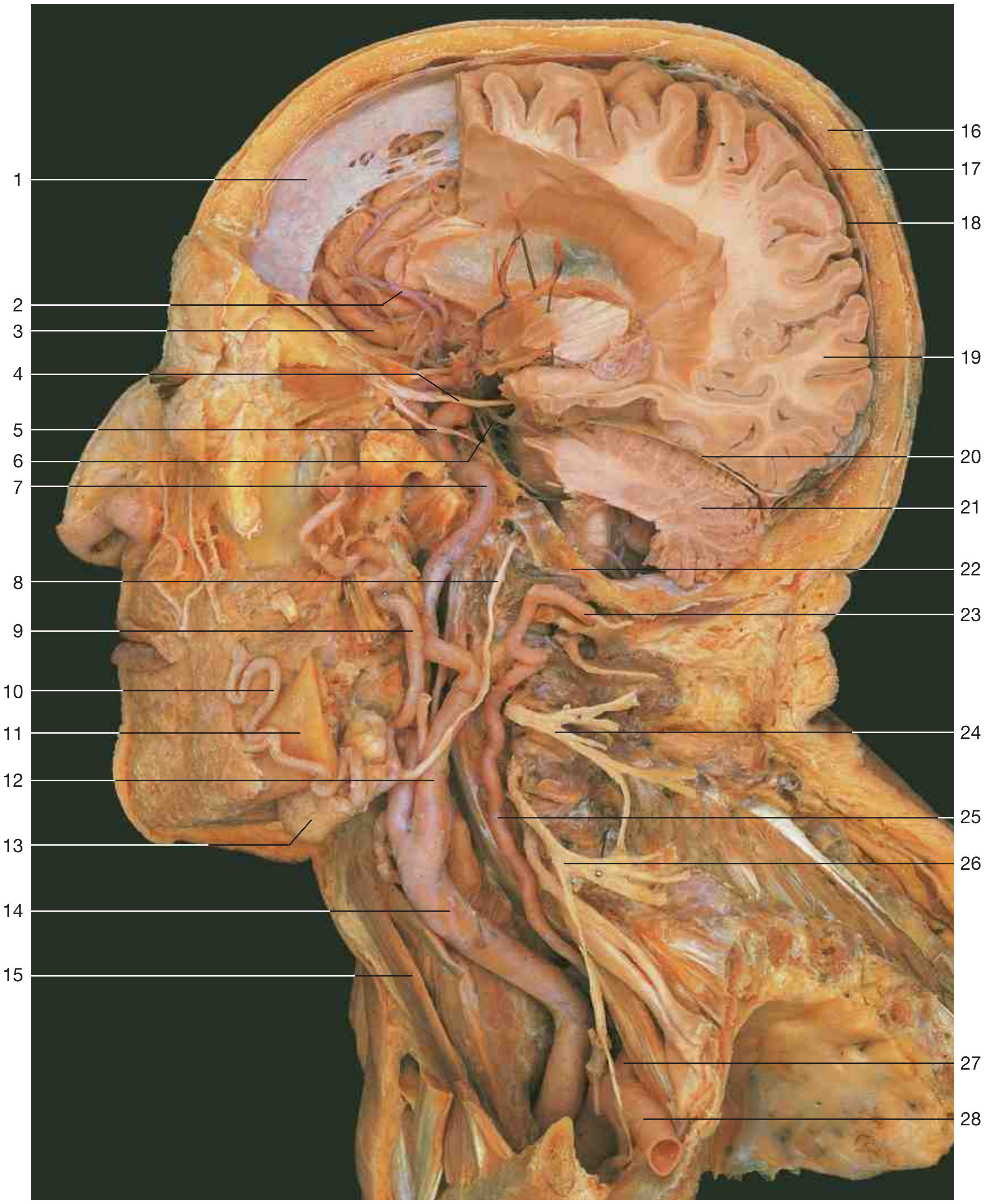
1 Anterior cerebral artery
2 Loop of the internal carotid artery
3 Middle cerebral artery
4 Posterior cerebral artery
5 Internal carotid artery
6 Superior cerebellar artery
7 Anterior inferior cerebellar artery
8 Posterior inferior cerebellar artery
9 Vertebral artery



Cerebral arteries. The areas supplied by the main arteries are indicated by different colors (lateral aspect).

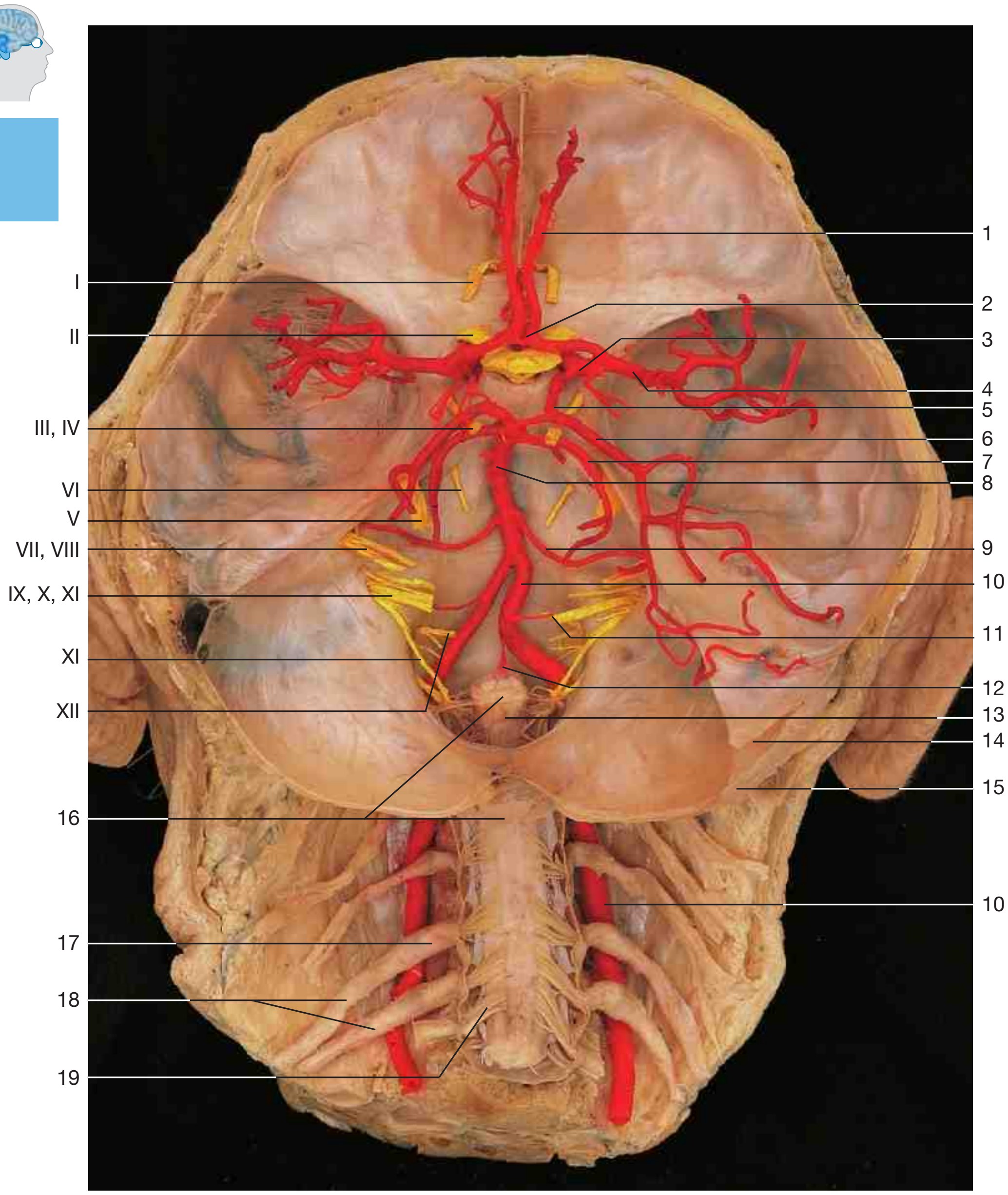
Areas of blood supply of the brain (cerebellum = light blue).

A = anterior cerebral artery (upper and medial parts of the cortex) (orange)
B = middle cerebral artery (lateral areas of the frontal, parietal, and temporal lobes) (white)
C = posterior cerebral artery (occipital lobe and inferior parts of the temporal lobe) (blue)



Dissection of the arteries of the brain and head (lateral aspect, superficial layers of facial region and left hemisphere and cerebellum partly removed).

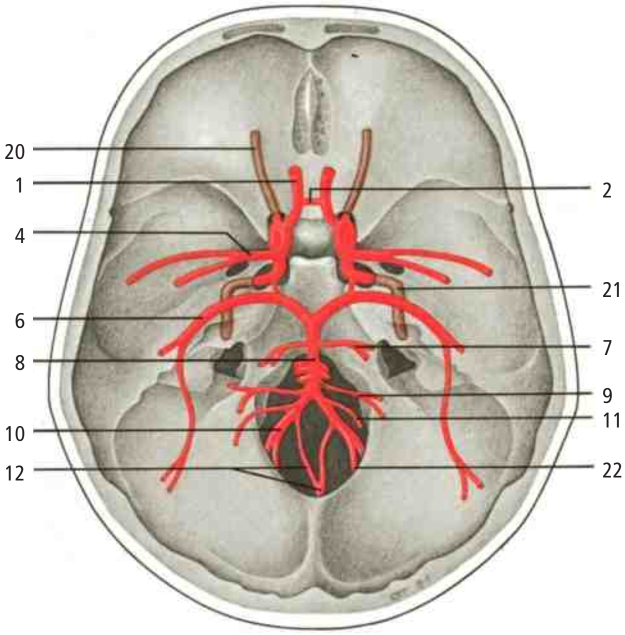
1 Falx cerebri
2 Anterior cerebral artery
3 Frontal lobe
4 Oculomotor nerve (n. III)
5 Abducent nerve (n. VI)
6 Posterior cerebral artery
7 Internal carotid artery, entering sinus cavernosus
8 Hypoglossus nerve (n. XII)
9 Maxillary artery
10 Facial artery
11 Mandible
12 External carotid artery
13 Submandibular gland
14 Common carotid artery
15 Sternohyoid muscle
16 Calvaria
17 Dura mater
18 Subarachnoidal space
19 Occipital lobe
20 Tentorium of cerebellum
21 Cerebellum
22 Base of skull
23 Vertebral artery (on the posterior arch of the atlas)
24 Cervical plexus
25 Vertebral artery (removed from the cervical vertebrae)
26 Brachial plexus
27 Vertebral artery (branching from the subclavian artery)
28 Subclavian artery



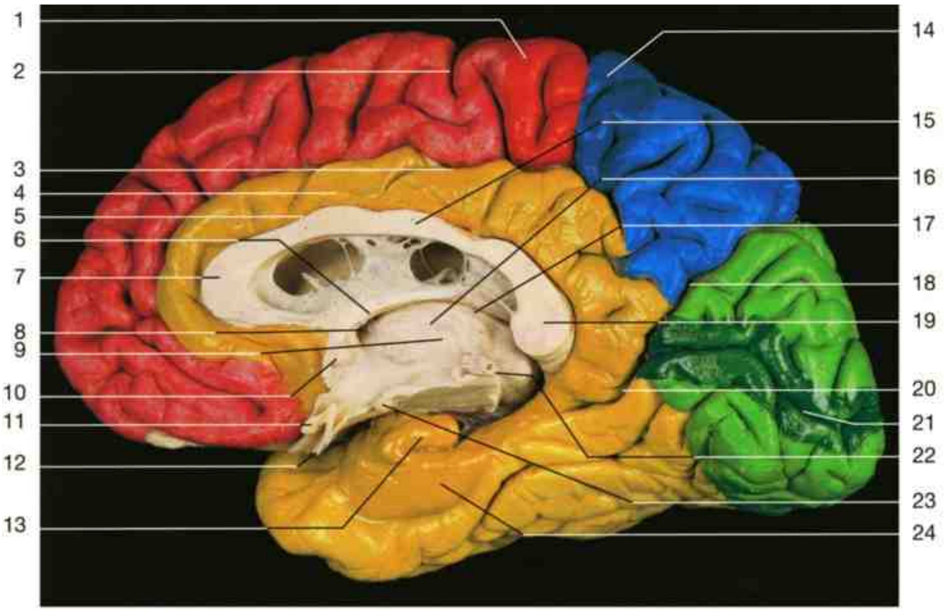
1	Anterior cerebral artery
2	Anterior communicating artery
3	Internal carotid artery
4	Medial cerebral artery
5	Posterior communicating artery
6	Posterior cerebral artery
7	Superior cerebellar artery
8	Basilar artery
9	Anterior inferior cerebellar artery with the artery of the labyrinth
10	Vertebral artery
11	Posterior inferior cerebellar artery
12	Anterior spinal artery
13	Pia mater of spinal cord
14	Tentorium cerebelli
15	Dura mater of the cranial cavity
16	Spinal cord
17	Spinal ganglion
18	Spinal nerves (C_3, C_4)
19	Posterior root filaments (fila radicularia post.)
20	Ophthalmic artery (within the orbit)
21	Internal carotid artery (within carotid canal)
22	Posterior spinal artery

I	Olfactory tract
II	Optic nerve
III	Oculomotor nerve
IV	Trochlear nerve
V	Trigeminal nerve
VI	Abducent nerve
VII	Facial nerve
VIII	Vestibulocochlear nerve
IX	Glossopharyngeal nerve
X	Vagus nerve
XI	Accessory nerve
XII	Hypoglossus nerve

Dissection of the arterial circle of the cerebrum at the base of the skull (from above; calvaria and brain have been removed; arteries are colored in red, cranial nerves [n. I–XII] in yellow).



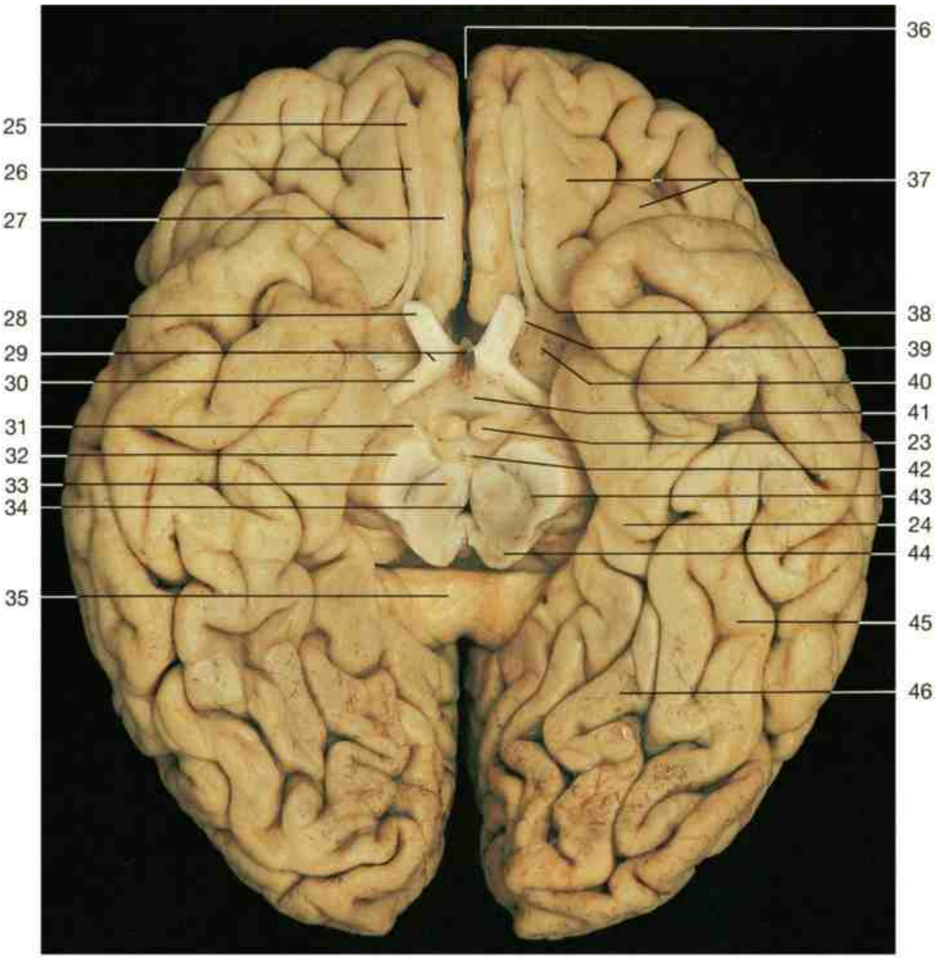
Arterial circle of Willis (superior aspect). (Schematic drawing.)



Brain, right hemisphere (medial aspect). Frontal pole to the left (midbrain divided, cerebellum and inferior part of brain stem removed).

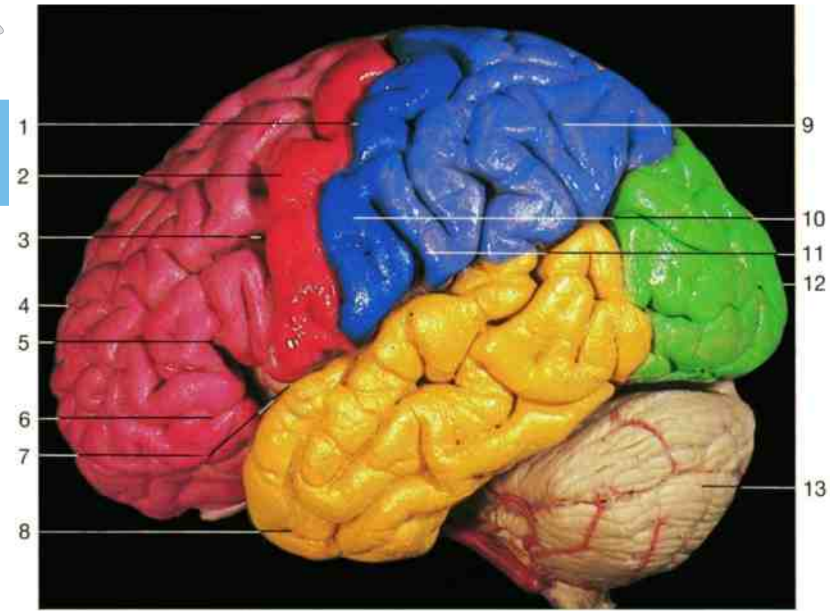
Red = Frontal lobe
Blue = Parietal lobe
Green = Occipital lobe
Yellow = Temporal lobe
Dark red = Precentral lobe

Dark blue = Postcentral lobe
Dark green = Calcarine sulcus
Dark yellow = Limbic cortex (cingulate and parahippocampal gyri)



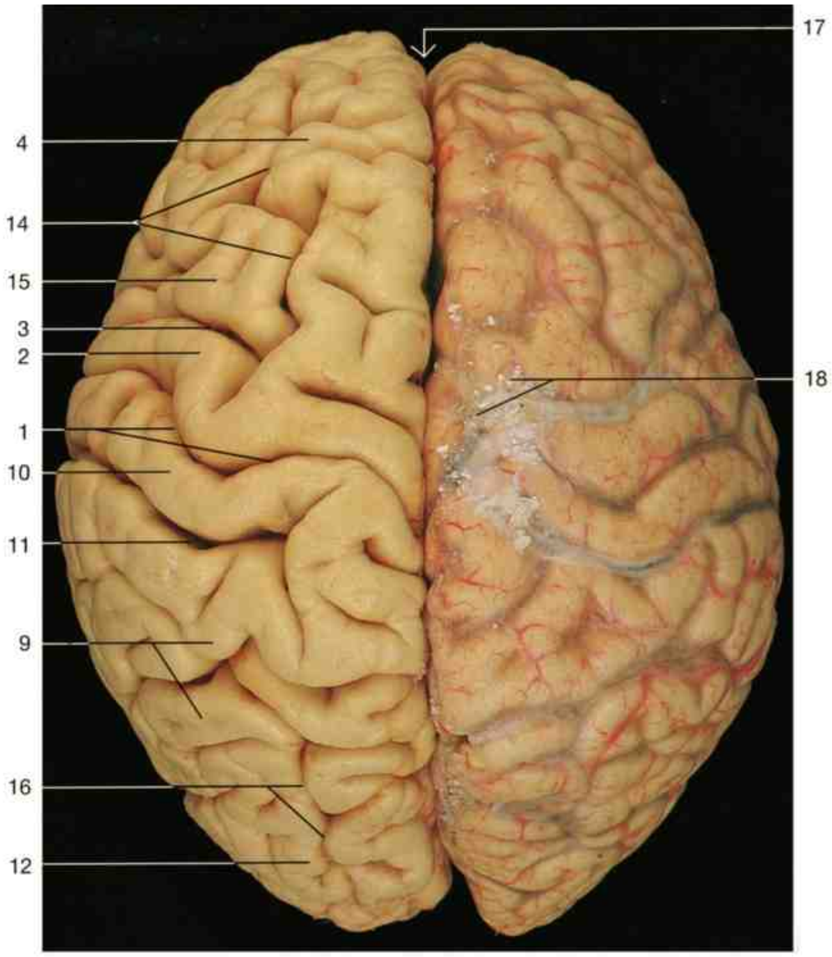
Brain (inferior aspect). Midbrain divided. Cerebellum and inferior part of brain stem removed. Frontal pole at the top.

1 Precentral gyrus
2 Precentral sulcus
3 Cingulate sulcus
4 Cingulate gyrus
5 Sulcus of corpus callosum
6 Fornix
7 Genu of corpus callosum
8 Interventricular foramen
9 Intermediate mass
10 Anterior commissure
11 Optic chiasma
12 Infundibulum
13 Uncus hippocampi
14 Postcentral gyrus
15 Body of corpus callosum
16 Third ventricle and thalamus
17 Stria medullaris
18 Parieto-occipital sulcus
19 Splenium of corpus callosum
20 Communication of calcarine and parieto-occipital sulcus
21 Calcarine sulcus
22 Pineal body
23 Mamillary body
24 Parahippocampal gyrus
25 Olfactory bulb
26 Olfactory tract
27 Gyrus rectus
28 Optic nerve
29 Infundibulum and optic chiasma
30 Optic tract
31 Oculomotor nerve
32 Pedunculus cerebri
33 Red nucleus
34 Cerebral aqueduct
35 Corpus callosum
36 Longitudinal fissure
37 Orbital gyri
38 Lateral root of olfactory tract
39 Medial root of olfactory tract
40 Olfactory tubercle and anterior perforated substance
41 Tuber cinereum
42 Interpeduncular fossa
43 Substantia nigra
44 Colliculi of the midbrain
45 Lateral occipitotemporal gyrus
46 Medial occipitotemporal gyrus



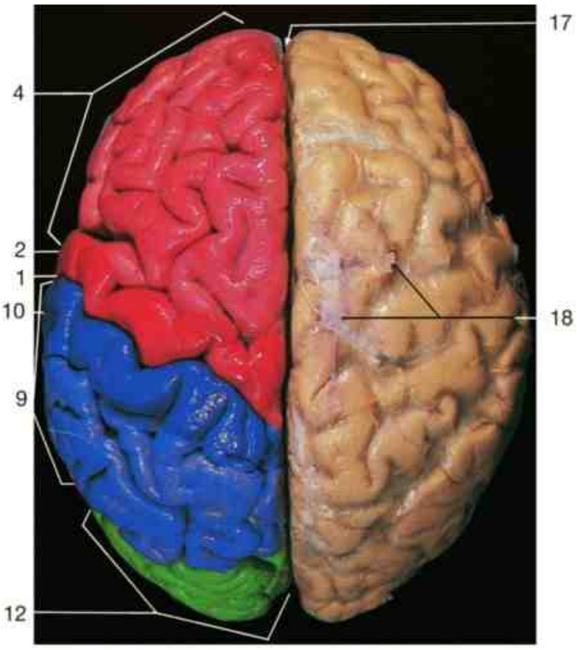
Brain, left hemisphere (lateral aspect). Frontal pole to the left.

1 Central sulcus
2 Precentral gyrus
3 Precentral sulcus
4 Frontal lobe
5 Anterior ascending ramus of lateral sulcus
6 Anterior horizontal ramus of lateral sulcus
7 Lateral sulcus
8 Temporal lobe
9 Parietal lobe
10 Postcentral gyrus
11 Postcentral sulcus
12 Occipital lobe
13 Cerebellum
14 Superior frontal sulcus
15 Middle frontal gyrus
16 Lunate sulcus
17 Longitudinal fissure
18 Arachnoid granulations

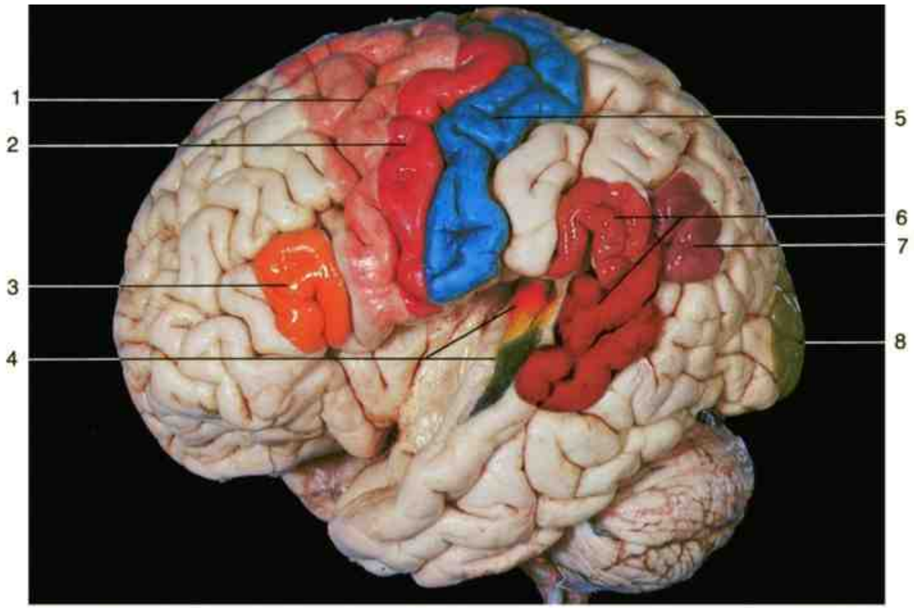


Brain (superior aspect). Right hemisphere with arachnoid and pia mater.

Pink = Frontal lobe
Blue = Parietal lobe
Green = Occipital lobe
Yellow = Temporal lobe
Dark red = Precentral gyrus
Dark blue = Postcentral gyrus

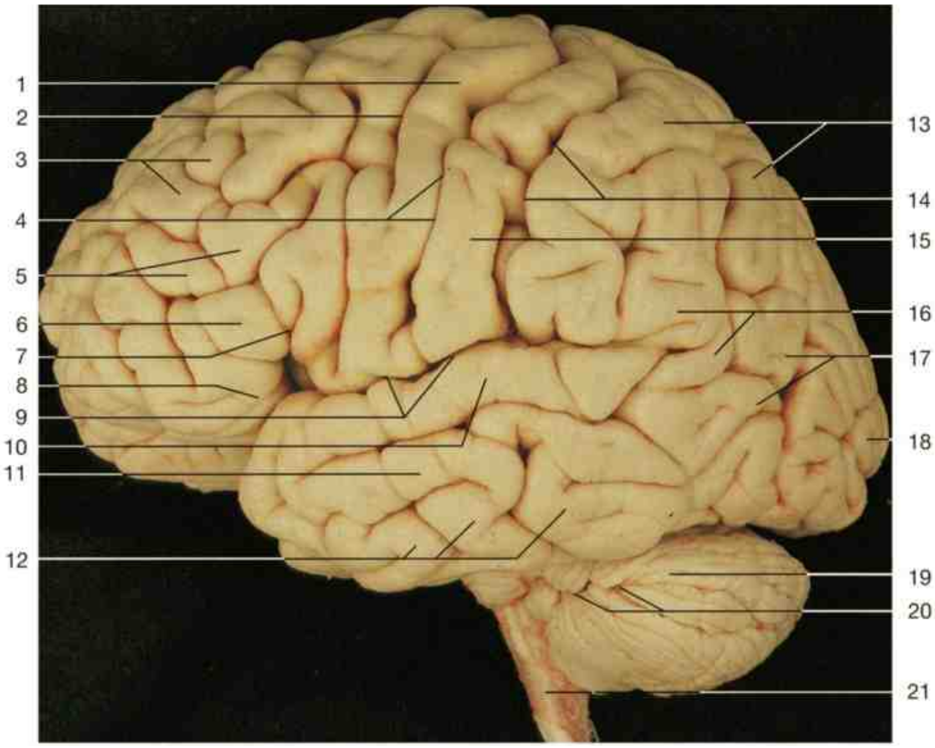


Brain (superior aspect). Lobes of the left hemisphere indicated by color; right hemisphere is covered with arachnoid and pia mater.



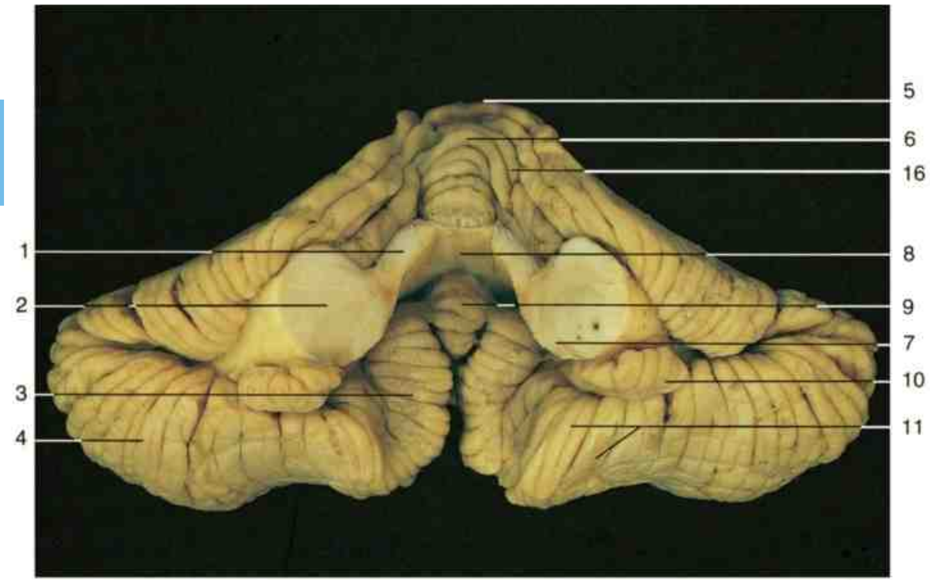
1 Premotor area
2 Somatomotor area
3 Motor speech area of Broca
4 Acoustic area
(red: high tone, dark green: low tone)
5 Somatosensory area
6 Sensory speech area of Wernicke
7 Reading comprehension area
8 Visuosensory area

Brain, left hemisphere (lateral aspect). **Main cortical areas** are colored. The lateral sulcus has been opened to display the insula and the inner surface of the temporal lobe.

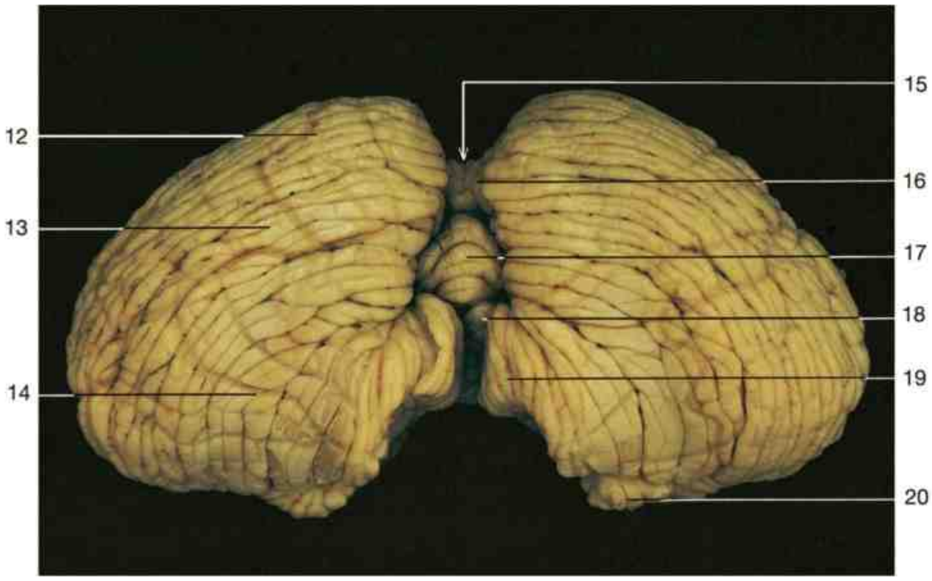


1 Precentral gyrus
2 Precentral sulcus
3 Superior frontal gyrus
4 Central sulcus
5 Middle frontal gyrus
6 Inferior frontal gyrus
7 Ascending ramus
8 Horizontal ramus
9 Posterior ramus
} of lateral sulcus
10 Superior temporal gyrus
11 Middle temporal gyrus
12 Inferior temporal gyrus
13 Parietal lobe
14 Postcentral sulcus
15 Postcentral gyrus
16 Supramarginal gyrus
17 Angular gyrus
18 Occipital lobe
19 Cerebellum
20 Horizontal fissure of cerebellum
21 Medulla oblongata

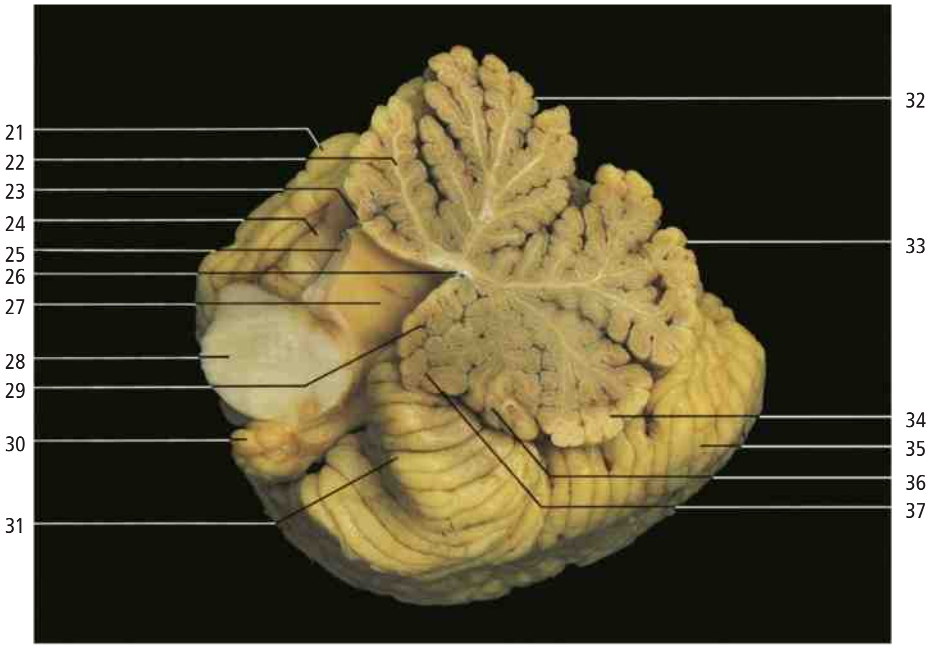
Brain, left hemisphere (lateral aspect). Frontal pole to the left.



Cerebellum (inferior anterior aspect). The cerebellar peduncles have been severed.

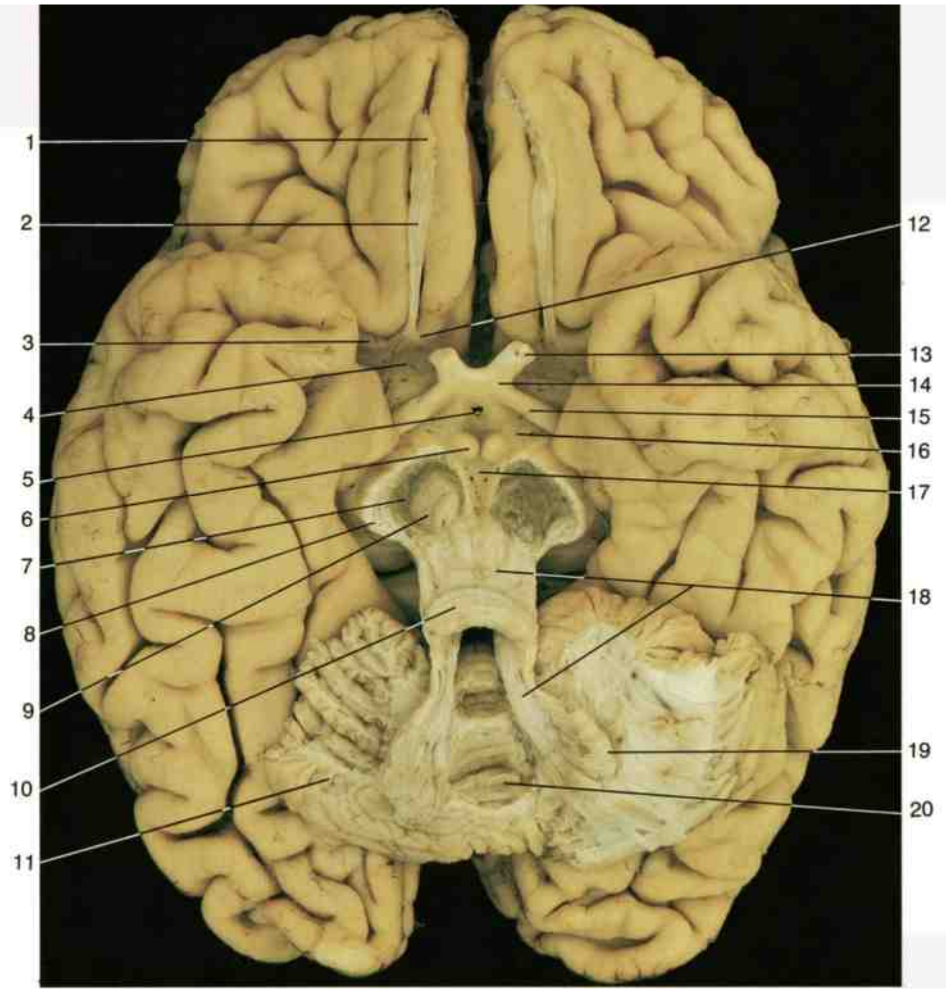


Cerebellum (inferior posterior aspect).

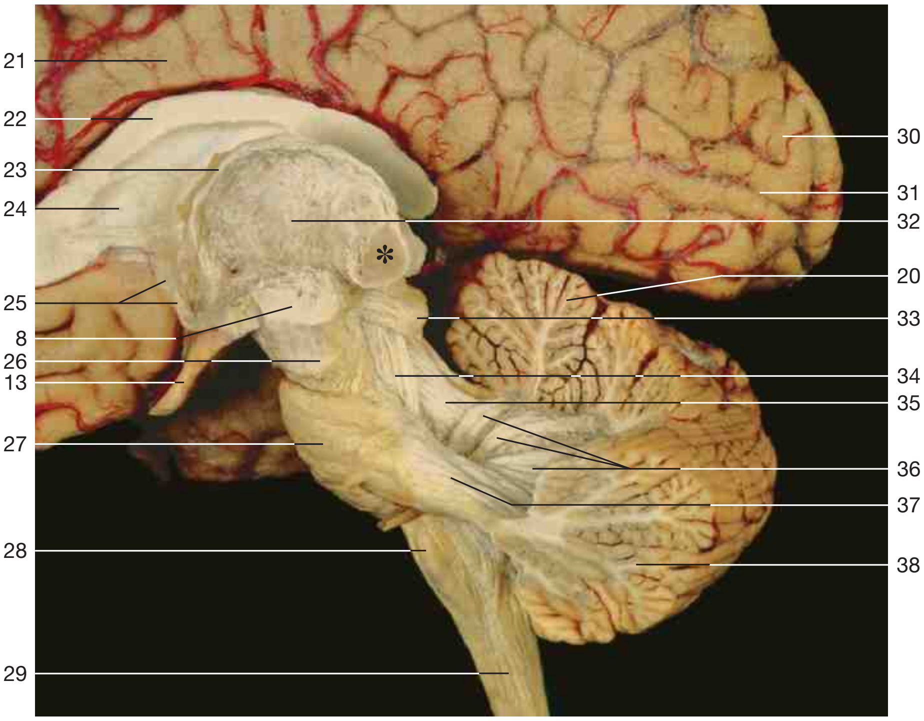


Median section through the cerebellum. Right cerebellar hemisphere and right half of vermis.

1 Superior cerebellar peduncle
2 Middle cerebellar peduncle
3 Cerebellar tonsil
4 Inferior semilunar lobule
5 Vermis
6 Central lobule of vermis
7 Inferior cerebellar peduncle
8 Superior medullary velum
9 Nodule of vermis
10 Flocculus of cerebellum
11 Biventral lobule
12 Left cerebellar hemisphere
13 Inferior semilunar lobule
14 Biventral lobule
15 Vermis of cerebellum
16 Tuber of vermis
17 Pyramid of vermis
18 Uvula of vermis
19 Tonsil of cerebellum
20 Flocculus of cerebellum
21 Right cerebellar hemisphere
22 Vermis (central lobule)
23 Cerebellar lingula
24 Ala of central lobule
25 Superior cerebellar peduncle
26 Fastigium
27 Fourth ventricle
28 Middle cerebellar peduncle
29 Nodule of vermis
30 Flocculus of cerebellum
31 Cerebellar tonsil
32 Culmen of vermis
33 Declive of vermis
34 Tuber of vermis
35 Inferior semilunar lobule
36 Pyramid of vermis (cut)
37 Uvula of vermis

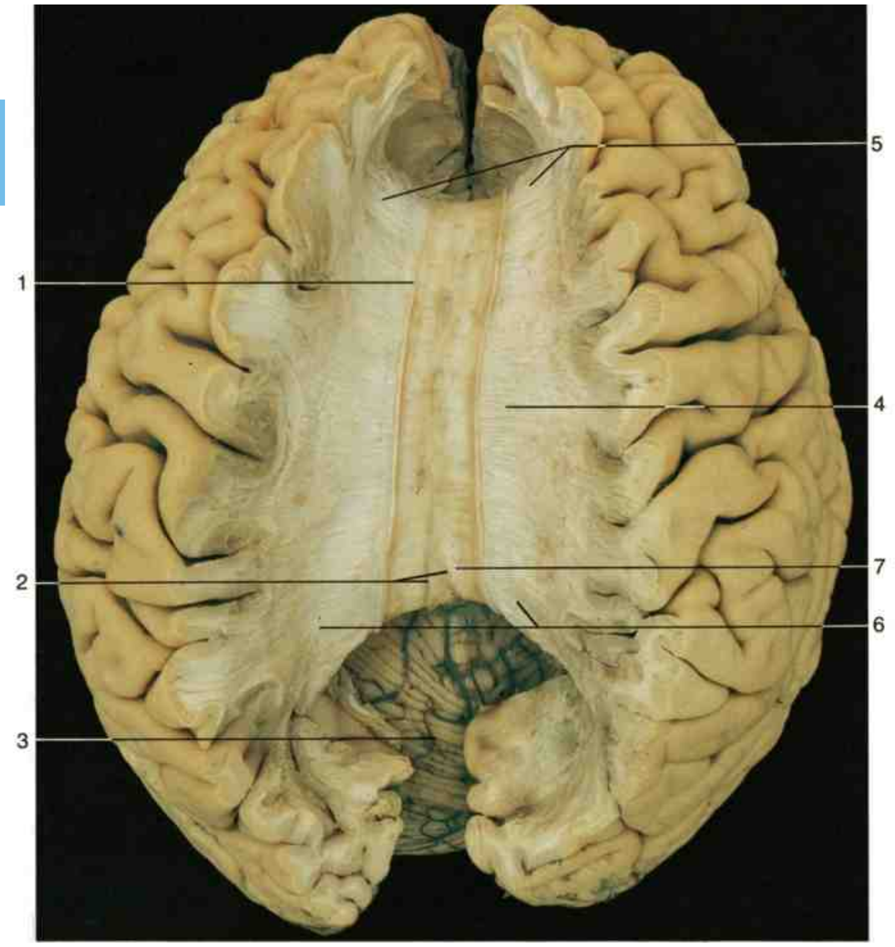


Brain and cerebellum (inferior aspect). Parts of the cerebellum have been removed to display the dentate nucleus and the main pathway to the midbrain (cerebellorubral tract).



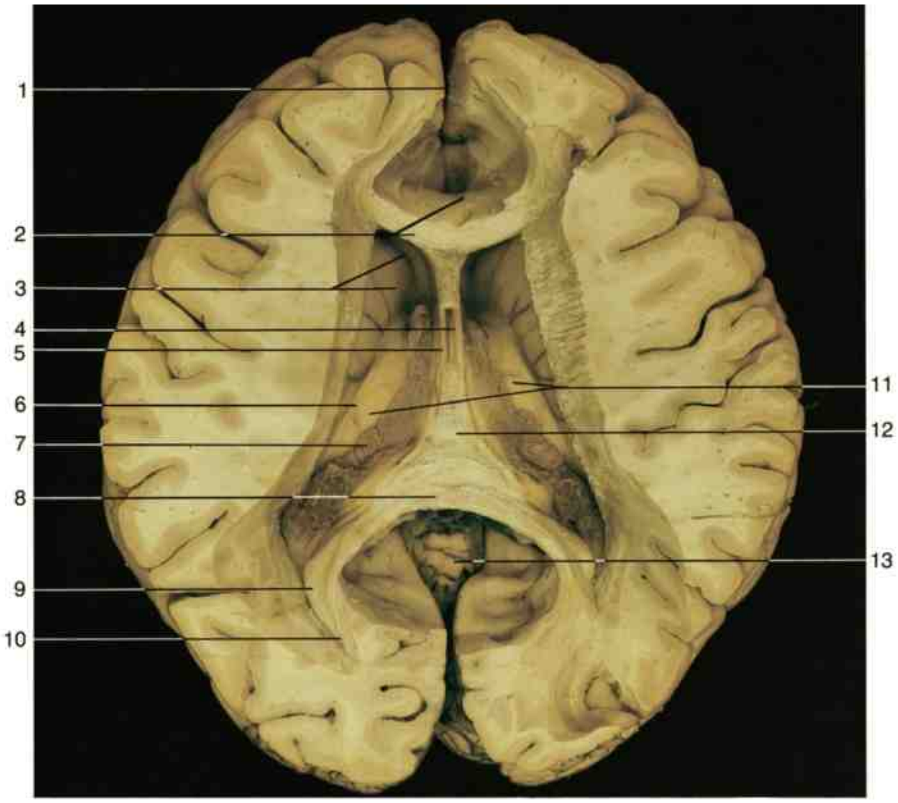
Dissection of the cerebellar peduncles and their connection with midbrain and diencephalon. A small part of pulvinar thalami (✻) has been cut to show inferior brachium.

1 Olfactory bulb
2 Olfactory tract
3 Lateral olfactory stria
4 Anterior perforated substance
5 Infundibulum (divided)
6 Mamillary body
7 Substantia nigra
8 Cerebral peduncle (cut)
9 Red nucleus
10 Decussation of superior cerebellar peduncle
11 Cerebellar hemisphere
12 Medial olfactory stria
13 Optic nerve
14 Optic chiasma
15 Optic tract
16 Posterior perforated substance
17 Interpeduncular fossa
18 Superior cerebellar peduncle and cerebellorubral tract
19 Dentate nucleus
20 Vermis of cerebellum
21 Cingulate gyrus
22 Corpus callosum
23 Stria terminalis
24 Septum pellucidum
25 Columna fornicis
26 Cerebral peduncle at midbrain level
27 Pons
28 Inferior olive
29 Medulla oblongata with lateral pyramidal tract
30 Occipital lobe
31 Calcarine sulcus
32 Thalamus
33 Inferior colliculus with brachium
34 Medial lemniscus
35 Superior cerebellar peduncle
36 Inferior cerebellar peduncle
37 Middle cerebellar peduncle
38 Cerebellar hemisphere



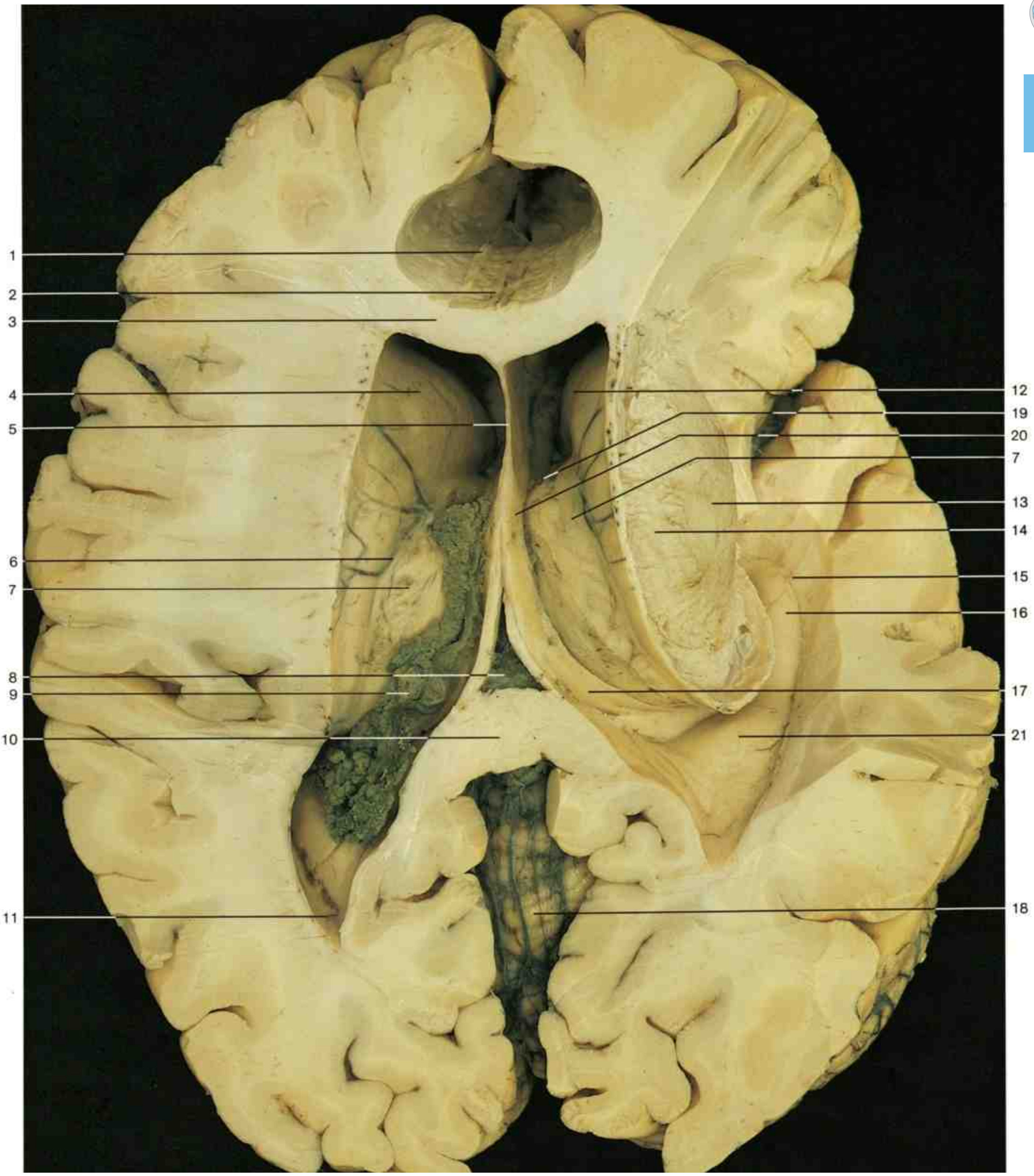
1 Lateral longitudinal stria of indusium griseum
2 Medial longitudinal stria of indusium griseum
3 Cerebellum
4 Radiating fibers of the corpus callosum
5 Forceps minor of corpus callosum
6 Forceps major of corpus callosum
7 Splenium of corpus callosum

Dissection of the brain I. The fiber system of the corpus callosum has been displayed by removing the cortex lying above it. Frontal pole at the top.



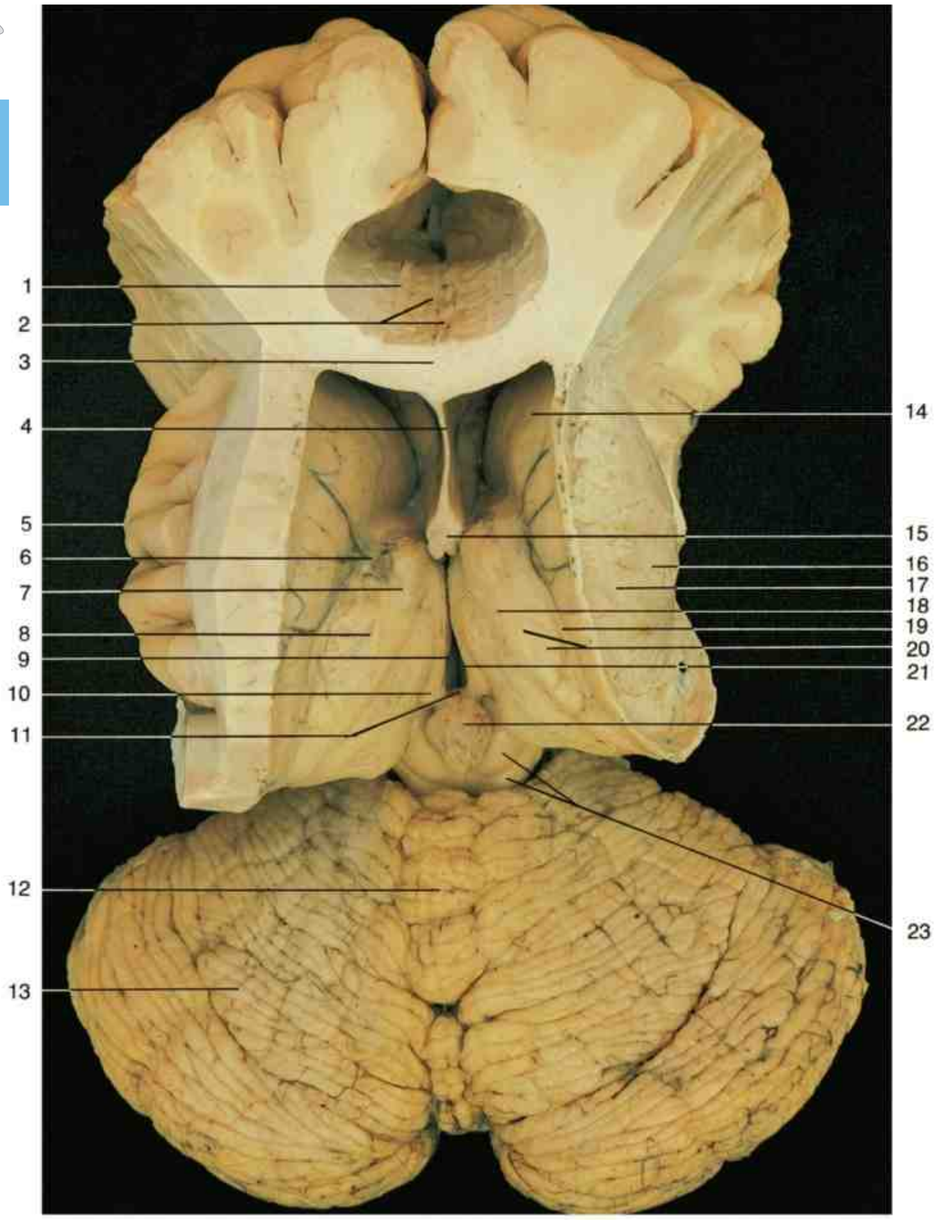
1 Longitudinal cerebral fissure
2 Genu of corpus callosum
3 Head of caudate nucleus and anterior horn of lateral ventricle
4 Cavum of septum pellucidum
5 Septum pellucidum
6 Stria terminalis
7 Choroid plexus of lateral ventricle
8 Splenium of corpus callosum
9 Calcar avis
10 Posterior horn of lateral ventricle
11 Thalamus (lamina affixa)
12 Commissure of fornix
13 Vermis of cerebellum

Dissection of the brain II. The lateral ventricles and subcortical nuclei of the brain are dissected. The corpus callosum has been partly removed. Frontal pole at the top.



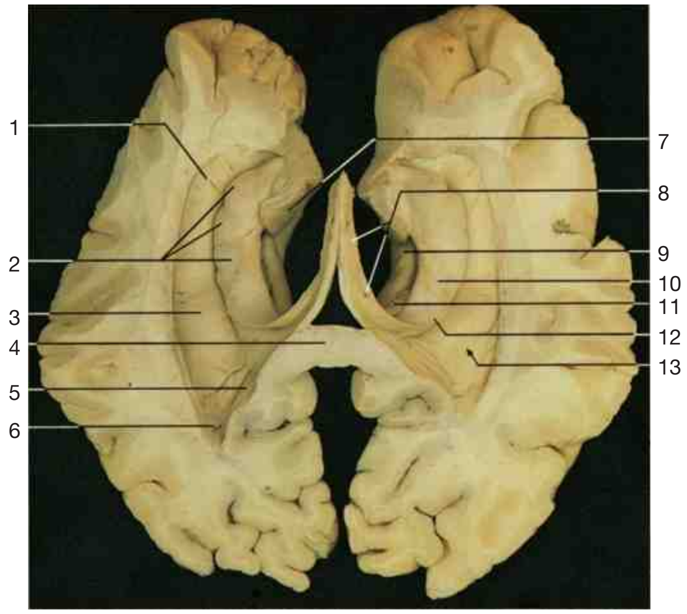
Dissection of the brain III (superior view of lateral ventricle and subcortical nuclei of the brain). Corpus callosum partly removed. At right, the entire lateral ventricle has been opened, the insula with claustrum and the extreme and external capsules have been removed, exposing the lentiform nucleus and the internal capsule.

1 Lateral longitudinal stria
2 Medial longitudinal stria
3 Genu of corpus callosum
4 Head of caudate nucleus
5 Septum pellucidum
6 Stria terminalis
7 Thalamus (lamina affixa)
8 Choroid plexus of third ventricle
9 Choroid plexus of lateral ventricle
10 Splenium of corpus callosum
11 Posterior horn of lateral ventricle
12 Anterior horn of lateral ventricle (head of caudate nucleus)
13 Putamen of lentiform nucleus
14 Internal capsule
15 Inferior horn of lateral ventricle
16 Pes hippocampi
17 Crus of fornix
18 Vermis of cerebellum with arachnoid and pia mater
19 Interventricular foramen
20 Right column of fornix
21 Collateral eminence



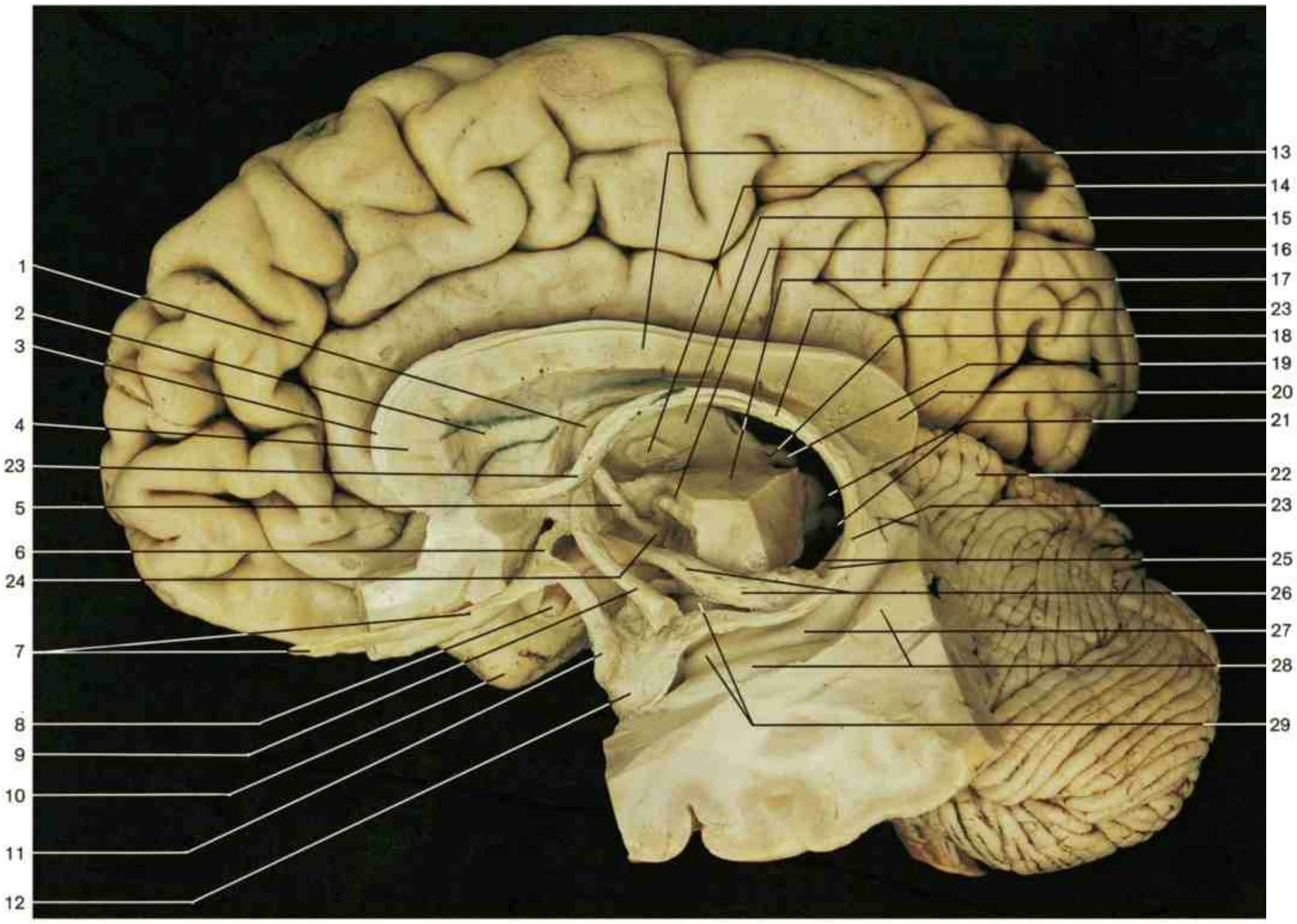
1 Lateral longitudinal stria
2 Medial longitudinal stria
3 Corpus callosum
4 Septum pellucidum
5 Insular gyri
6 Thalamostriate vein
7 Anterior tubercle of thalamus
8 Thalamus
9 Stria medullaris of thalamus
10 Habenular trigone
11 Habenular commissure
12 Vermis of cerebellum
13 Left hemisphere of cerebellum
14 Head of caudate nucleus
15 Columns of fornix
16 Putamen of lentiform nucleus
17 Internal capsule
18 Taenia of choroid plexus
19 Stria terminalis and thalamostriate vein
20 Lamina affixa
21 Third ventricle
22 Pineal body
23 Superior and inferior colliculus of midbrain

Dissection of the brain IVa. Temporal lobe, fornix, and the posterior corpus callosum have been removed (this part of the specimen is depicted below). Frontal pole at top (superior aspect).

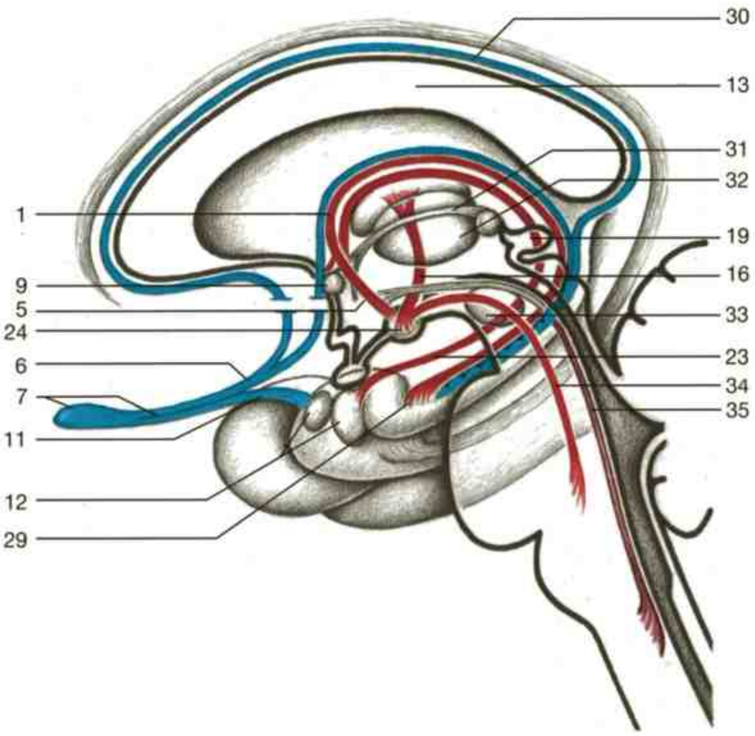


1 Inferior horn of lateral ventricle
2 Hippocampal digitations
3 Collateral eminence
4 Splenium of corpus callosum
5 Calcar avis
6 Posterior horn of lateral ventricle
7 Uncus of parahippocampal gyrus
8 Body and crus of fornix
9 Parahippocampal gyrus
10 Pes hippocampi
11 Dentate gyrus
12 Hippocampal fimbria
13 Lateral ventricle

Dissection of the brain IVb. Depicted is the portion of the brain removed from the specimen above. **Temporal lobe and limbic system** (superior aspect). Columns of fornix are cut.

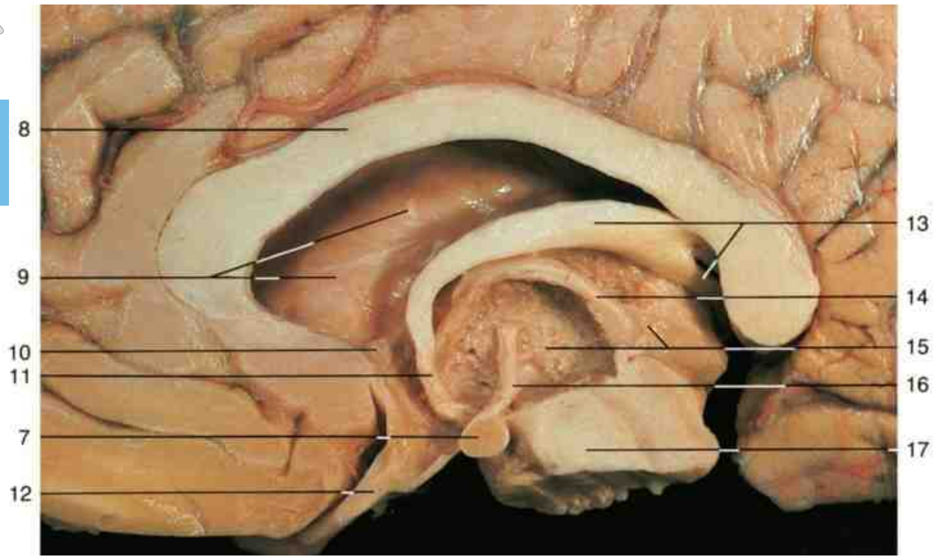


Dissection of the limbic system. Left side, lateral aspect. Corpus callosum has been cut in the median plane. The left thalamus and the left hemisphere have been partly removed.



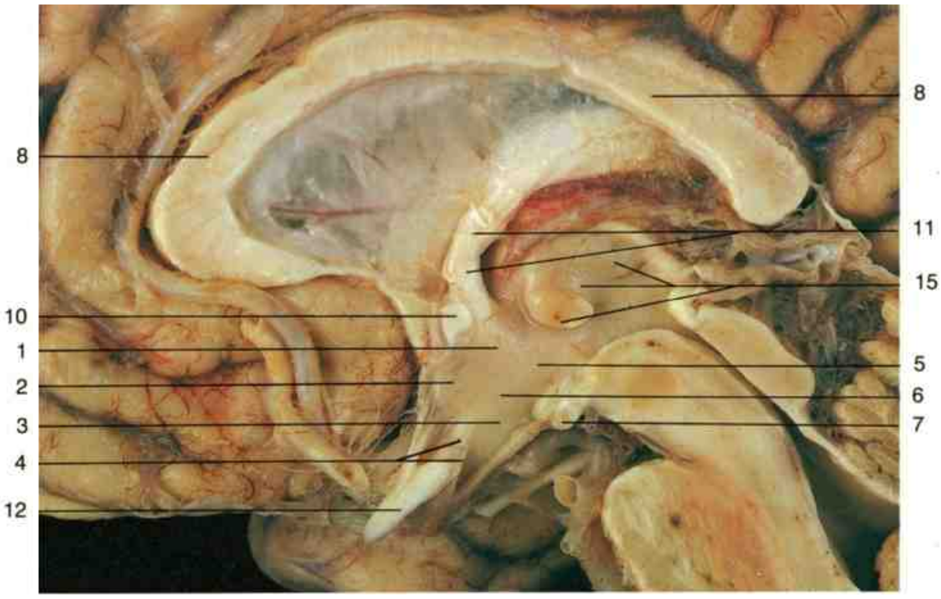
Main pathways of limbic and olfactory system (schematic drawing). Blue = afferent pathways; red = efferent pathways.

1 Body of fornix
2 Septum pellucidum
3 Lateral longitudinal stria
4 Genu of corpus callosum
5 Column of fornix
6 Medial olfactory stria
7 Olfactory bulb and olfactory tract
8 Optic nerve
9 Anterior commissure (left half)
10 Right temporal lobe
11 Lateral olfactory stria
12 Amygdala
13 Body of corpus callosum
14 Interthalamic adhesion
15 Third ventricle and right thalamus
16 Mamillothalamic fasciculus
17 Part of the thalamus
18 Habenular commissure
19 Pineal body
20 Splenium of corpus callosum
21 Colliculi of midbrain
22 Vermis of cerebellum
23 Stria terminalis
24 Mamillary body
25 Fimbria of hippocampus and pes hippocampi
26 Left optic tract and lateral geniculate body
27 Lateral ventricle and parahippocampal gyrus
28 Collateral eminence
29 Hippocampal digitations
30 Supracallosal gyrus (longitudinal stria)
31 Stria medullaris of thalamus
32 Thalamus
33 Red nucleus
34 Mamillotegmental fasciculus
35 Dorsal longitudinal fasciculus (Schütz)

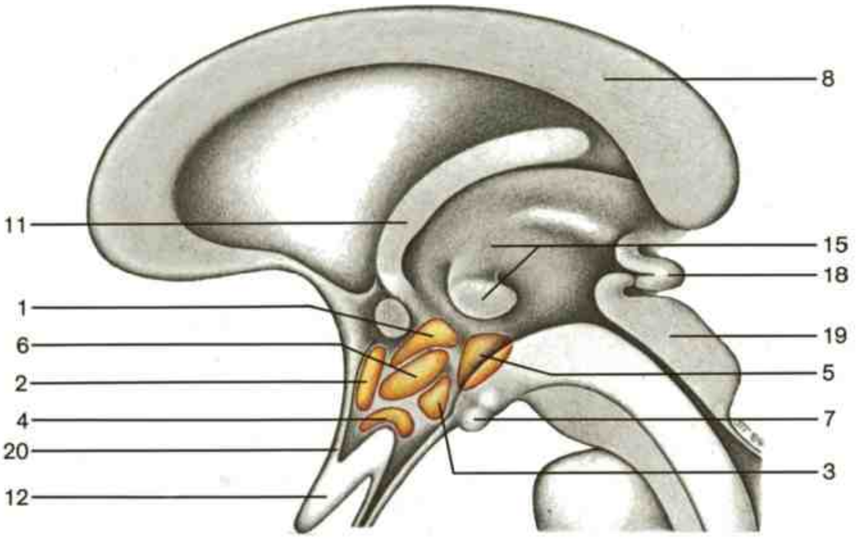


Median section through the diencephalon. Medial part of the thalamus and septum pellucidum have been removed to show the fornix and mamillothalamic fasciculus.

1	Paraventricular nucleus	Hypothalamic nuclei
2	Pre-optic nucleus	
3	Ventromedial nucleus	
4	Supra-optic nucleus	
5	Posterior nucleus	
6	Dorsomedial nucleus	
7	Mamillary body	
8	Corpus callosum	
9	Lateral ventricle (showing caudate nucleus)	
10	Anterior commissure	
11	Column of fornix	
12	Optic chiasma	
13	Crus of fornix	
14	Stria medullaris of thalamus	
15	Thalamus and interthalamic adhesion	
16	Mamillothalamic fasciculus of Vicq d'Azyr	
17	Cerebral peduncle	
18	Pineal body	
19	Tectum of midbrain	
20	Lamina terminalis	

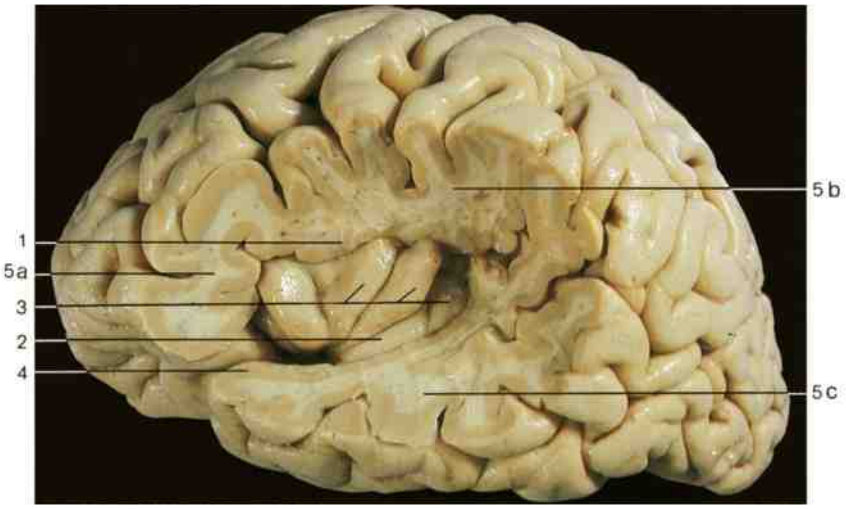


Median section through the diencephalon and midbrain; location of hypothalamic nuclei.

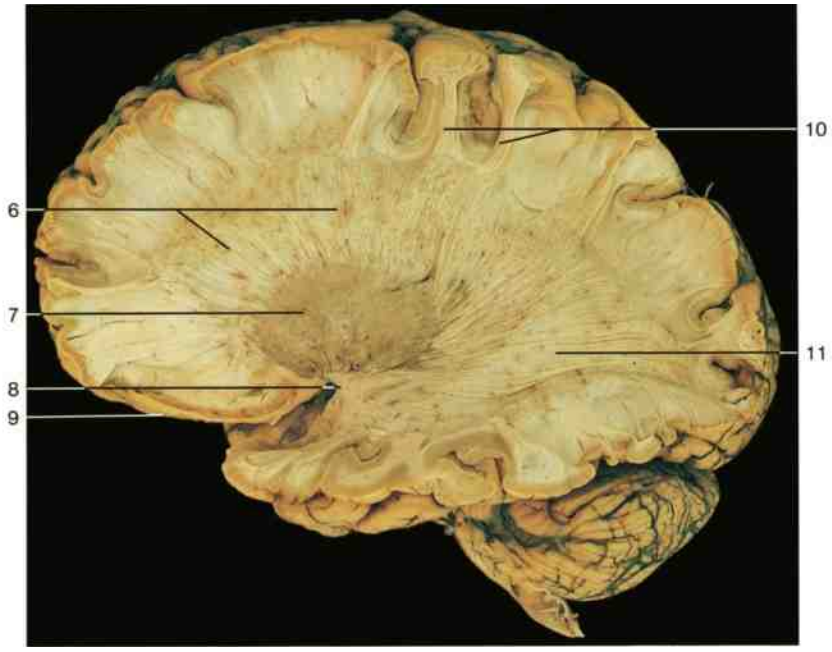


Position of main hypothalamic nuclei (schematic drawing).

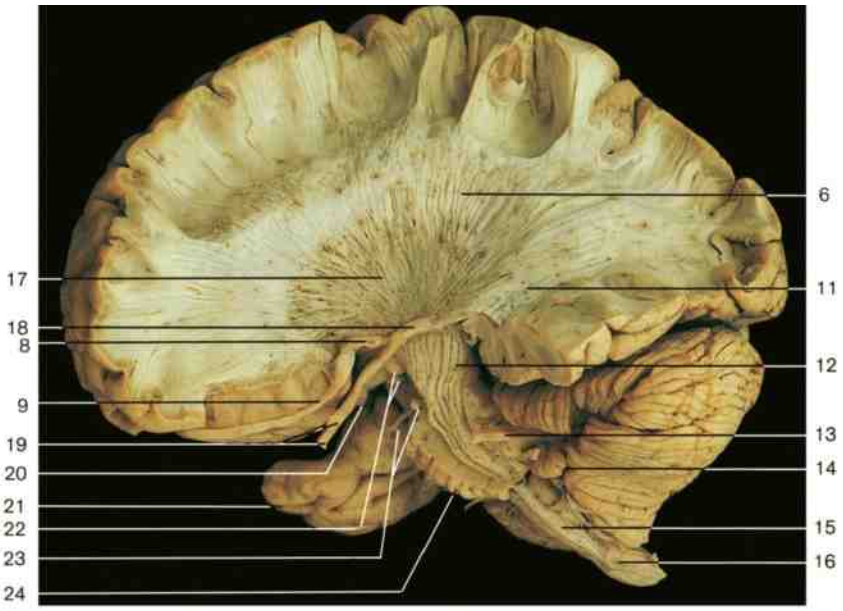
1 Circular sulcus of insula
2 Long gyrus of insula
3 Short gyri of insula
4 Limen insulae
5 Opercula (cut)
  a Frontal operculum
  b Frontoparietal operculum
  c Temporal operculum
6 Corona radiata
7 Lentiform nucleus
8 Anterior commissure
9 Olfactory tract
10 Cerebral arcuate fibers
11 Optic radiation
12 Cerebral peduncle
13 Trigeminal nerve (n. V)
14 Flocculus of cerebellum
15 Pyramidal tract
16 Decussation of pyramidal tract
17 Internal capsule
18 Optic tract
19 Optic nerve (n. II)
20 Infundibulum
21 Temporal lobe (right side)
22 Mamillary bodies
23 Oculomotor nerve (n. III)
24 Transverse fibers of pons



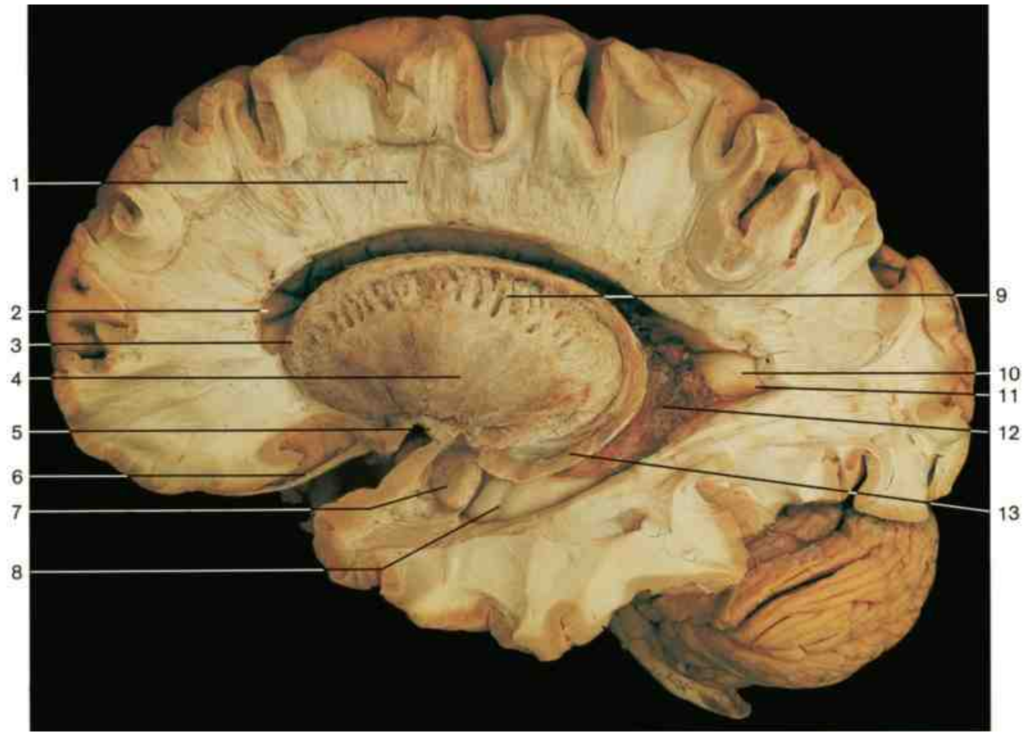
Insula (Reili). The opercula of the frontal, parietal, and temporal lobes have been removed to display the insular gyri. Left hemisphere.



Dissection of the corona radiata, left hemisphere. Frontal pole on the left.

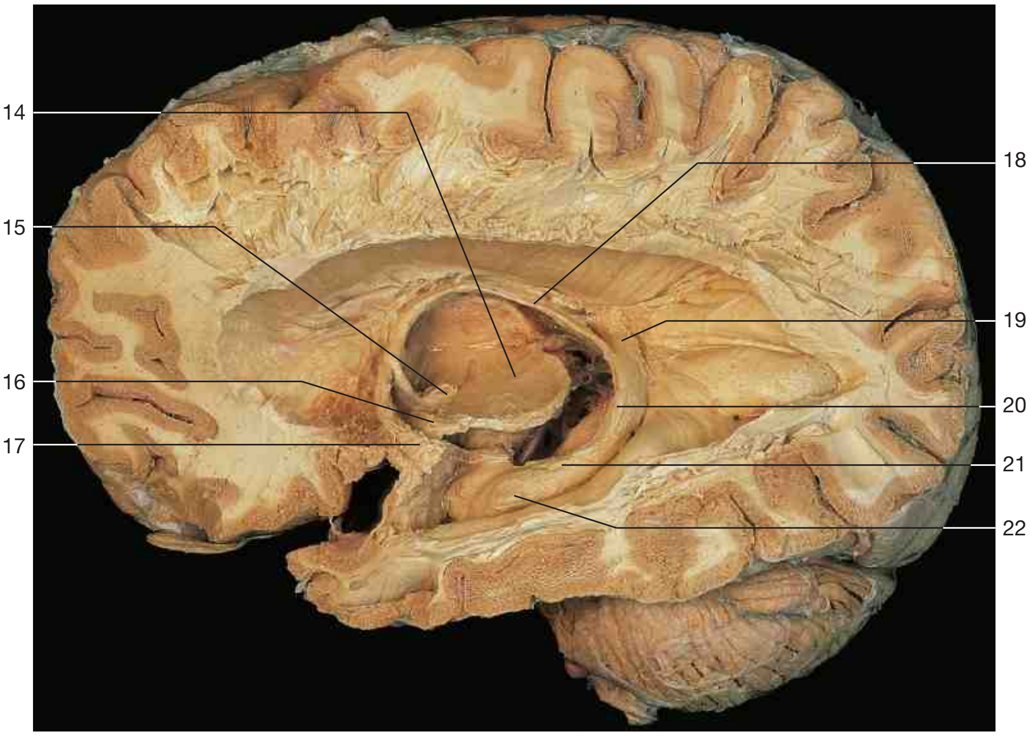


◁ **Corona radiata and internal capsule,** left hemisphere. Lentiform nucleus removed (frontal pole to the left).

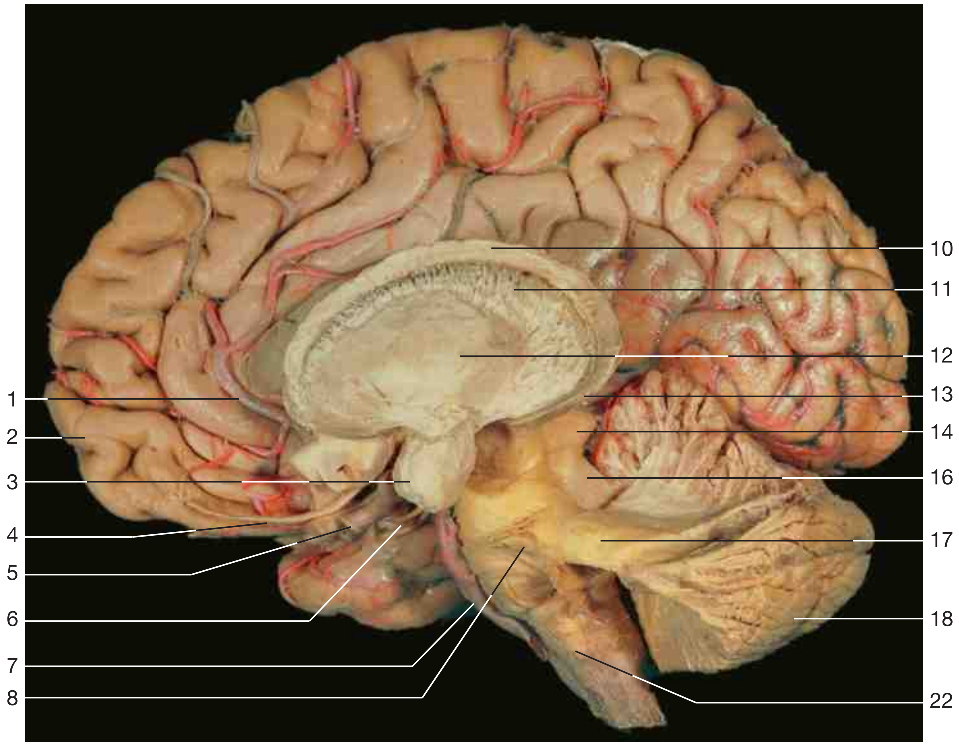


Dissection of the subcortical nuclei and internal capsule, left hemisphere (lateral aspect). Frontal pole to the left. The lateral ventricle has been opened, and the insular gyri and claustrum have been removed, revealing the lentiform nucleus and the internal capsule.

1	Corona radiata
2	Anterior horn of lateral ventricle
3	Head of caudate nucleus
4	Putamen
5	Anterior commissure
6	Olfactory tract
7	Amygdala
8	Hippocampal digitations
9	Internal capsule
10	Calcar avis
11	Posterior horn of lateral ventricle
12	Choroid plexus of lateral ventricle
13	Caudal extremity of caudate nucleus
14	Pulvinar of thalamus
15	Mamillary body
16	Optic tract
17	Anterior commissure
18	Fornix
19	Longitudinal stria
20	Dentate gyrus
21	Hippocampal fimbria
22	Pes hippocampi

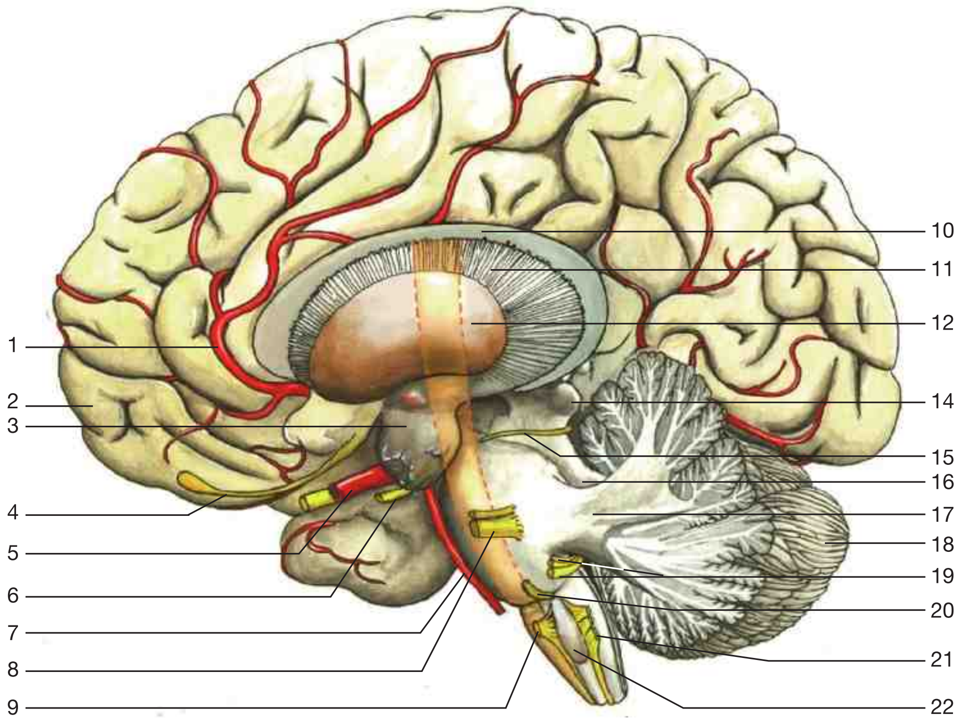


Dissection of the limbic system and the fornix (lateral aspect). Frontal pole to the left.

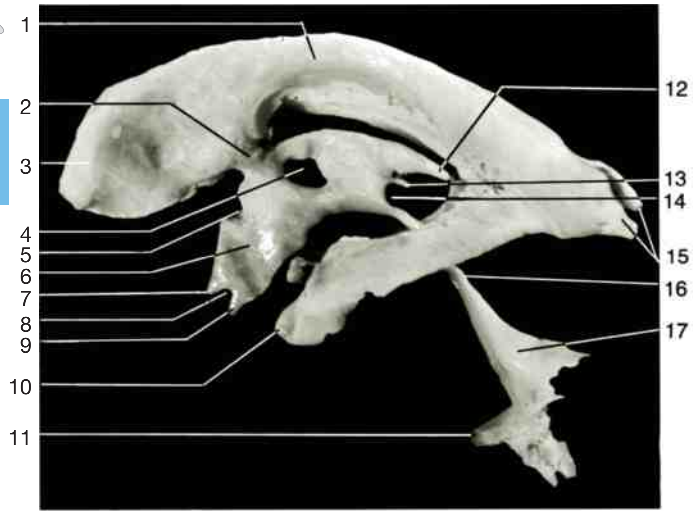


Right hemisphere together with brain stem and cerebellum (lateral aspect).
The connections of the brain stem with the cerebellum are dissected. The amygdala of the left hemisphere is shown. The corpus callosum has been partly removed.

1	Anterior cerebral artery
2	Frontal lobe
3	Amygdala (amygdaloid body)
4	Olfactory tract
5	Internal carotid artery
6	Oculomotor nerve (n. III)
7	Basilar artery
8	Trigeminal nerve (n. V)
9	Hypoglossal nerve (n. XII)
10	Caudate nucleus
11	Internal capsule
12	Lentiform nucleus
13	Caudal extremity of caudate nucleus
14	Inferior colliculus of midbrain
15	Trochlear nerve (n. IV)
16	Superior cerebellar peduncle
17	Middle cerebellar peduncle
18	Cerebellum
19	Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
20	Abducent nerve (n. VI)
21	Glossopharyngeal nerve (n. IX), vagus nerve (n. X), and accessory nerve (n. XI)
22	Inferior olive

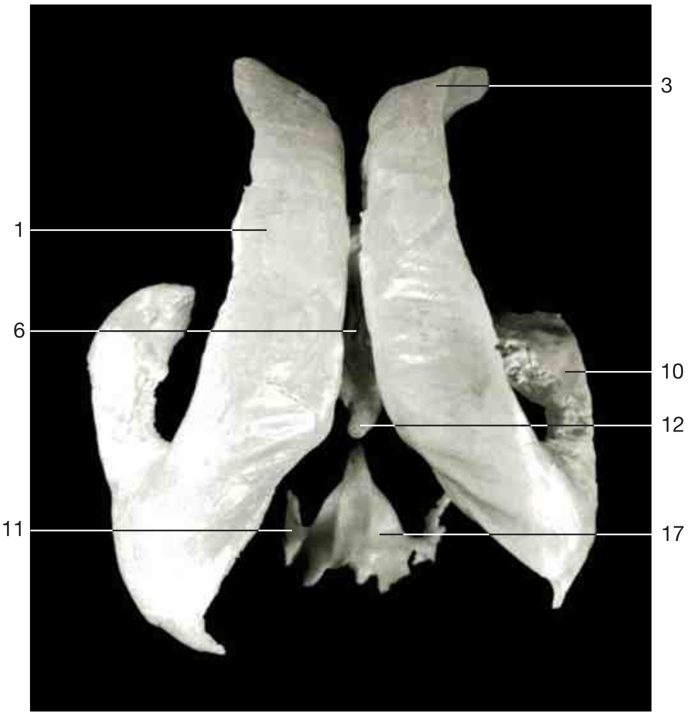


Schematic drawing of the dissected brain shown above (lateral aspect).
The course of the pyramidal tracts is indicated in red. Cranial nerves = yellow.



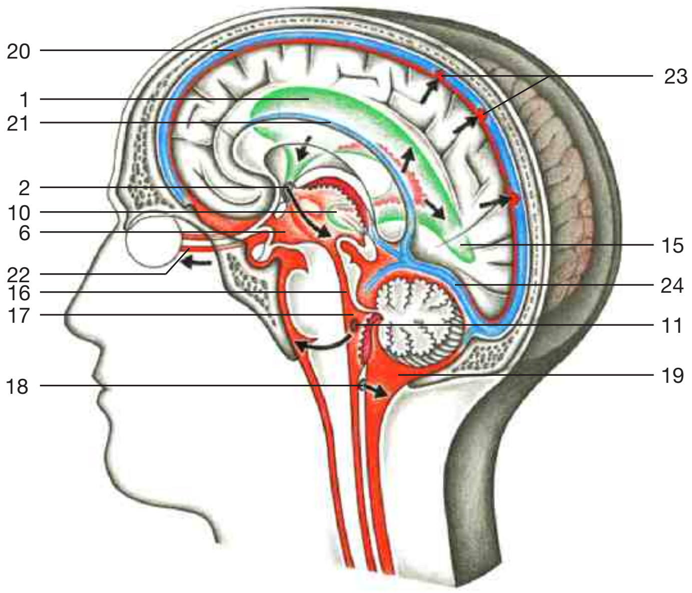
Cast of ventricular cavities of the brain (lateral aspect), frontal pole to the left.

1 Central part of the lateral ventricle
2 Interventricular foramen of Monro
3 Anterior horn of the lateral ventricle
4 Site of interthalamic adhesion
5 Notch for anterior commissure
6 Third ventricle
7 Optic recess
8 Notch for optic chiasma
9 Infundibular recess
10 Inferior horn of lateral ventricle with indentation of amygdaloid body
11 Lateral recess and lateral aperture of Luschka
12 Suprapineal recess
13 Pineal recess
14 Notch for posterior commissure
15 Posterior horn of lateral ventricle
16 Cerebral aqueduct

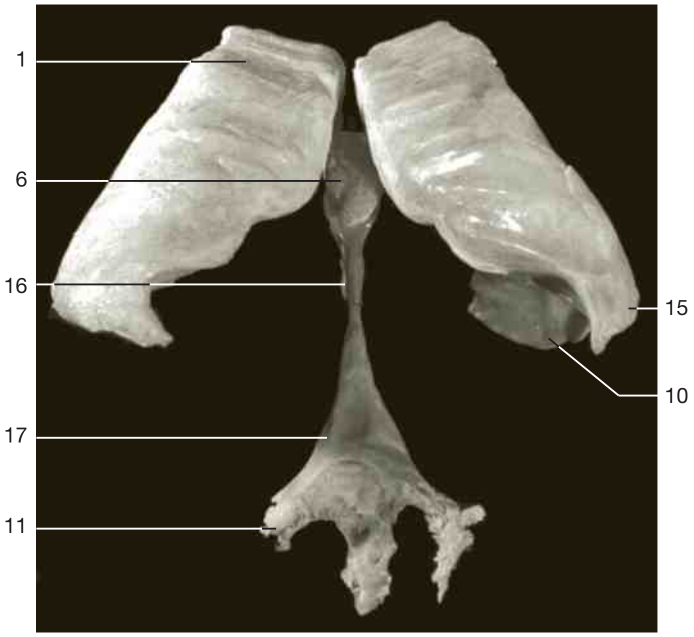


Cast of ventricular cavities of the brain (superior aspect), frontal pole at top.

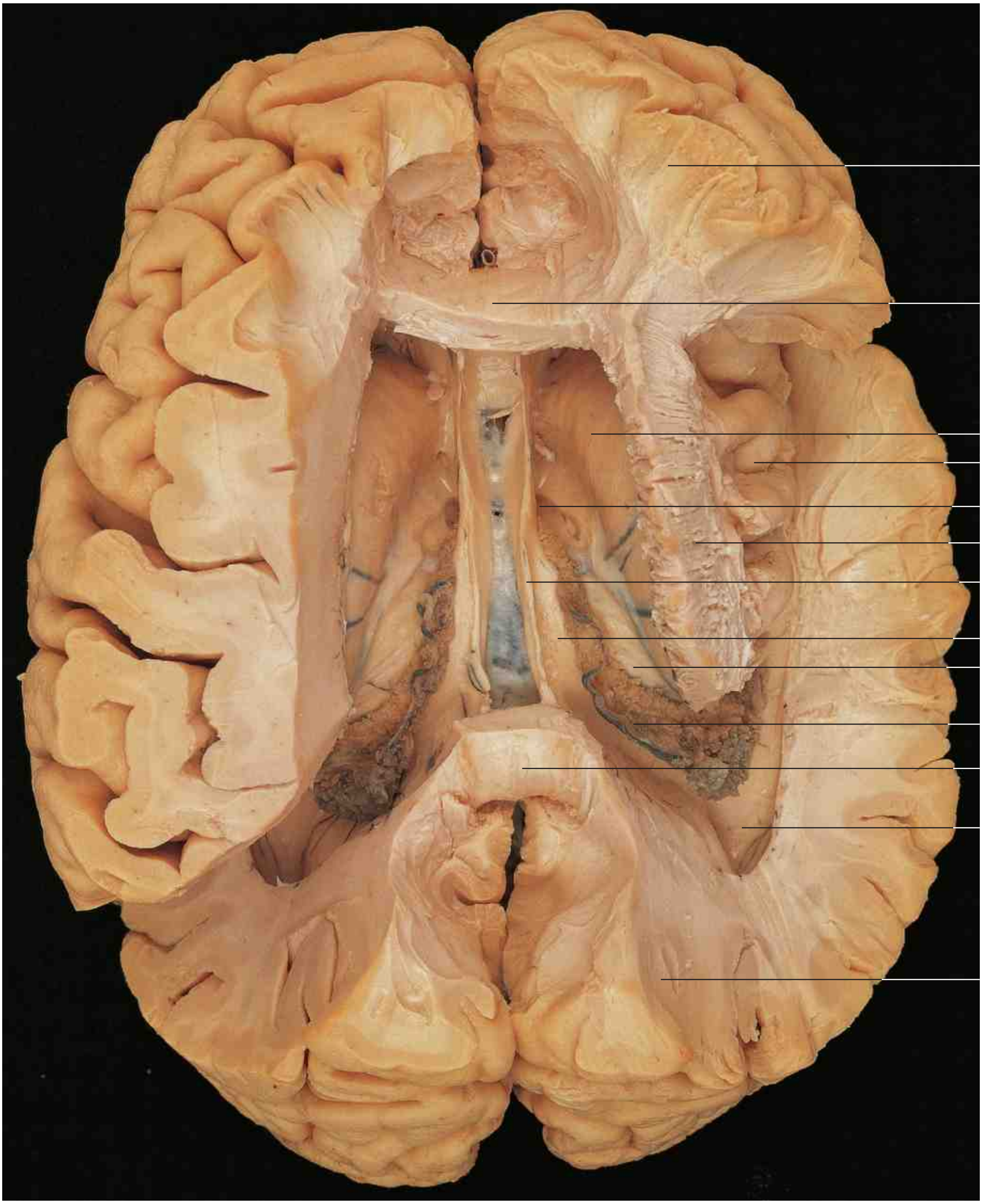
17 Fourth ventricle
18 Median aperture of Magendie
19 Cerebellomedullary cistern
20 Superior sagittal sinus
21 Inferior sagittal sinus
22 Intervaginal space of optic nerve
23 Arachnoid granulations of Pacchioni
24 Straight sinus



Position of ventricular cavities (schematic drawing). The direction of flow of cerebrospinal fluid is indicated by arrows. Green = right lateral ventricle; red = choroidal plexus with cerebrospinal fluid.

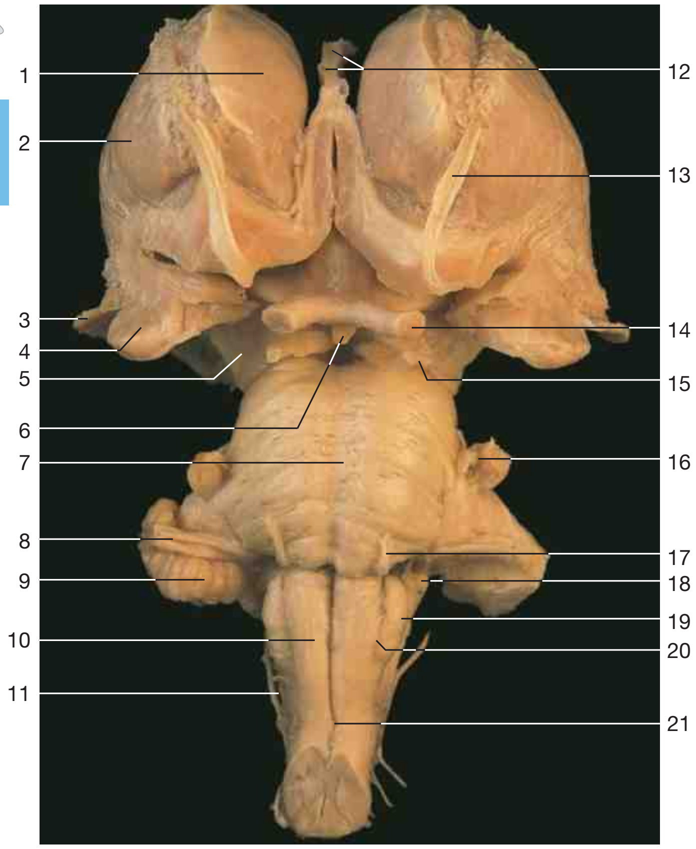


Cast of ventricular cavities of the brain (posterior aspect).



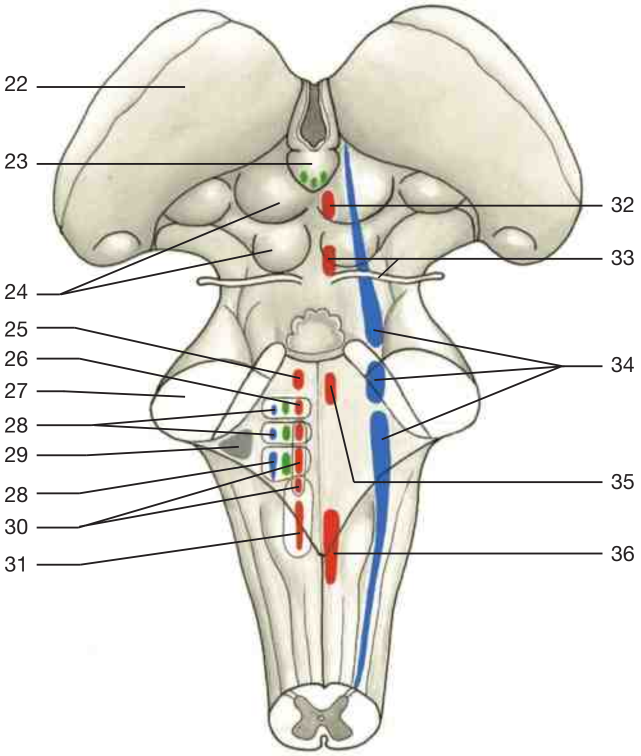
Dissection of the brain (superior view of the lateral ventricle and of the subcortical nuclei of the brain). Corpus callosum partly removed. Fornix and choroid plexus of the left lateral ventricle are shown.

1	Frontal lobe of brain	7	Lateral longitudinal stria
2	Corpus callosum	8	Body of fornix
3	Caudate nucleus (head)	9	Thalamus
4	Insular cortex	10	Choroid plexus
5	Interventricular foramen	11	Lateral ventricle (occipital horn)
6	Internal capsule	12	Occipital lobe of brain

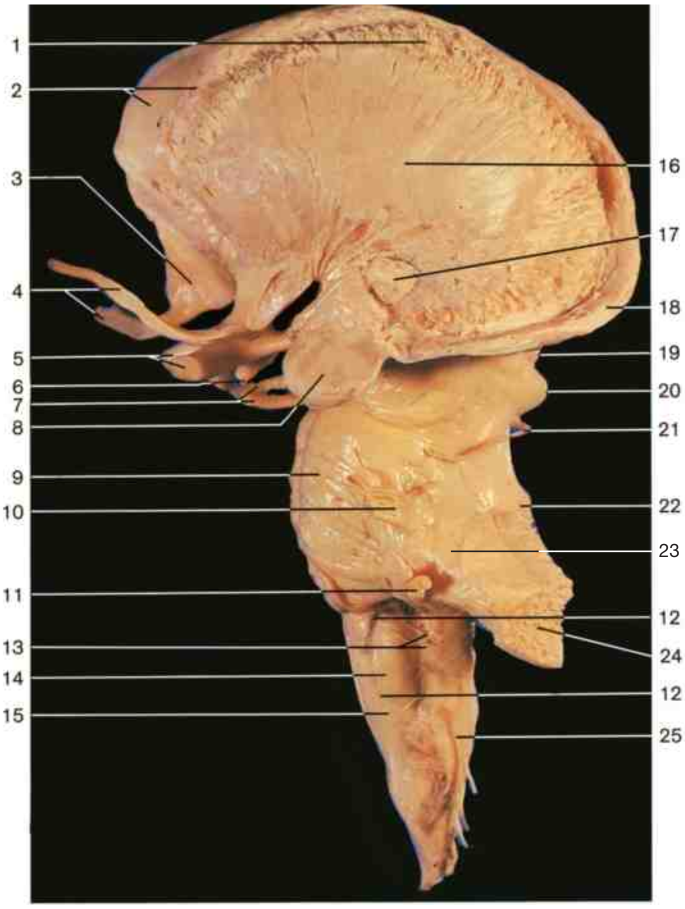


Brain stem (ventral aspect).

1 Caudate nucleus
2 Lentiform nucleus
3 Caudal extremity of caudate nucleus
4 Amygdaloid body
5 Cerebral peduncle
6 Infundibulum
7 Pons
8 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
9 Cerebellar flocculus
10 Medulla oblongata
11 Accessory nerve (n. XI)
12 Fornix and column of fornix
13 Olfactory tract
14 Optic nerve (n. II)
15 Oculomotor nerve (n. III)
16 Trigeminal nerve (n. V)
17 Abducent nerve (n. VI)
18 Glossopharyngeal nerve (n. IX) and vagus nerve (n. X)
19 Inferior olive
20 Hypoglossal nerve (n. XII)
21 Decussation of the pyramids
22 Thalamus
23 Epiphysis
24 Tectum of midbrain (superior and inferior colliculus)
25 Motor nucleus of trigeminal nerve (n. V)
26 Facial nucleus (n. VII)
27 Middle cerebellar peduncle
28 Visceral nucleus of glossopharyngeal and vagus nerves (n. IX and n. X), salivatory nucleus
29 Vestibular nucleus (n. VIII)
30 Ambiguus nucleus (n. IX, n. X, n. XI)
31 Spinal nucleus of accessory nerve (n. XI)
32 Motor nucleus of oculomotor nerve (n. III)
33 Trochlear nucleus and nerve (n. IV)
34 Sensory nucleus of trigeminal nerve (n. V)
35 Abducent nucleus (n. VI)
36 Hypoglossal nucleus (n. XII)



Brain stem (dorsal aspect, schematic drawing). Location of cranial nerve nuclei.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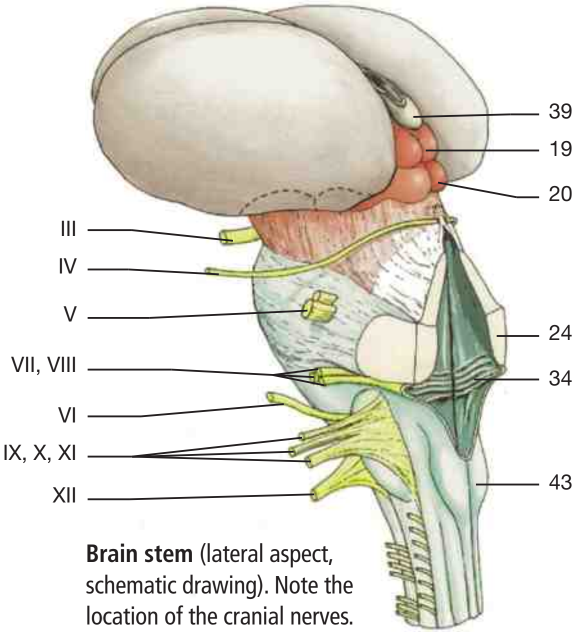
Brain stem (left lateral aspect). Cerebellar peduncles have been severed, cerebellum and cerebral cortex have been removed.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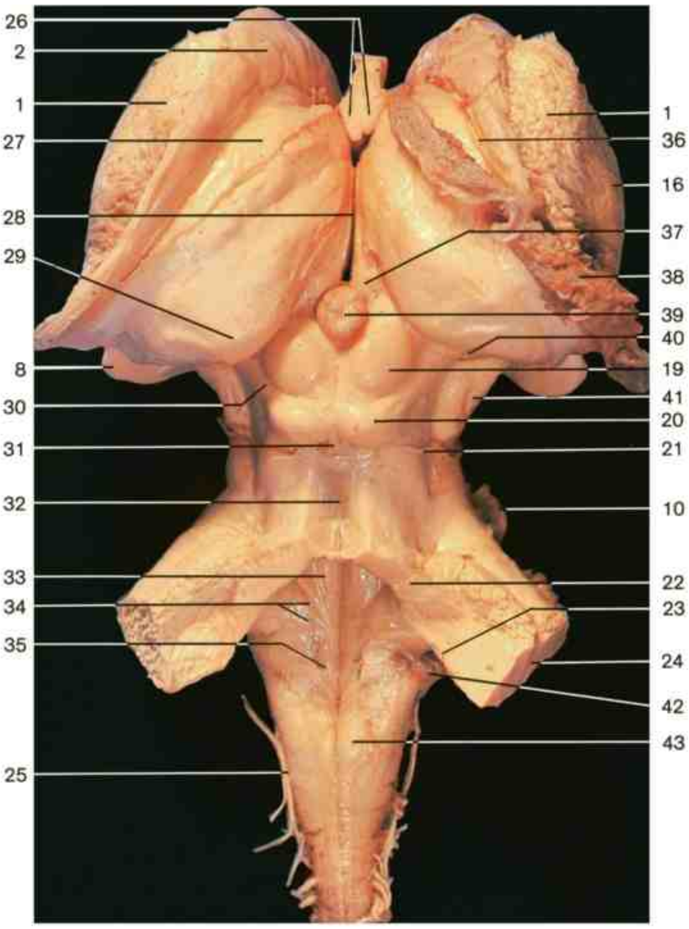
Brain stem (lateral aspect, schematic drawing). Note the location of the cranial nerves. III–XII = cranial nerves.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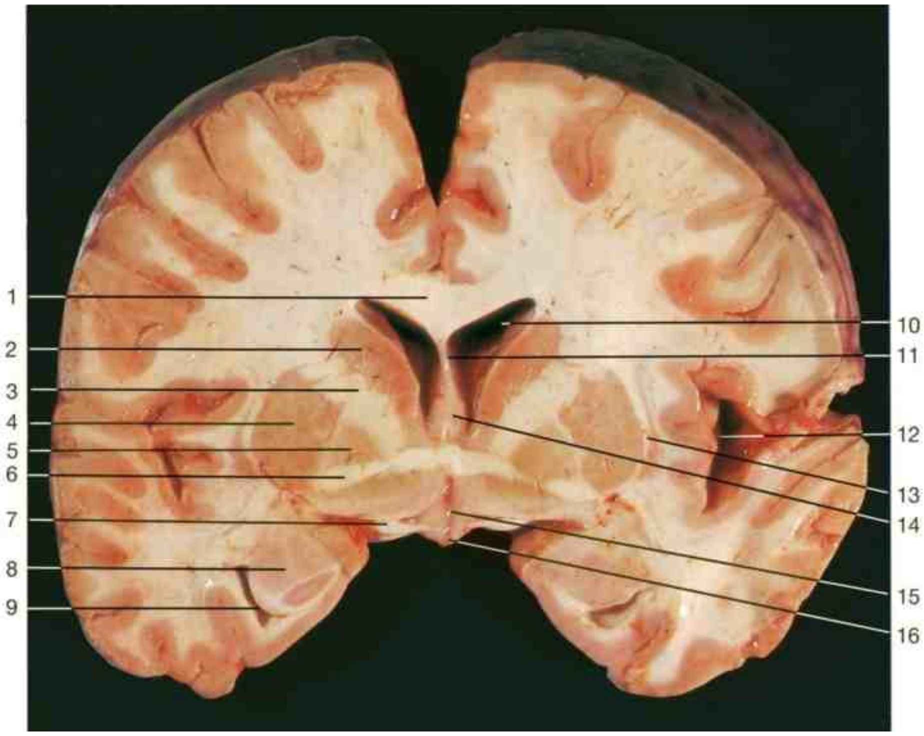
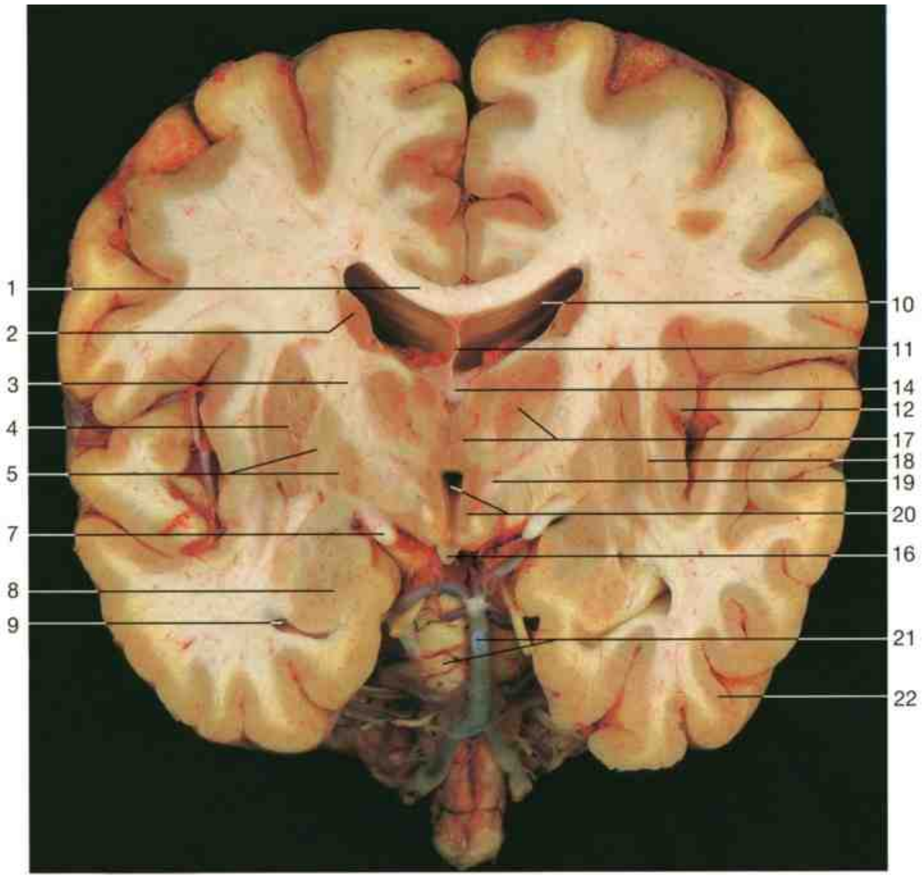
Brain stem (dorsal aspect). Cerebellum removed.

1	Internal capsule
2	Head of the caudate nucleus
3	Olfactory trigone
4	Olfactory tracts
5	Optic nerves (n. II)
6	Infundibulum
7	Oculomotor nerve (n. III)
8	Amygdaloid body
9	Pons
10	Trigeminal nerve (n. V)
11	Facial and vestibulocochlear nerves (n. VII, n. VIII)
12	Hypoglossal nerve (n. XII)
13	Glossopharyngeal and vagus nerves (n. IX, n. X)
14	Inferior olive
15	Medulla oblongata
16	Lentiform nucleus
17	Anterior commissure
18	Tail of caudate nucleus
19	Superior colliculus
20	Inferior colliculus
21	Trochlear nerve (n. IV)
22	Superior cerebellar peduncle
23	Inferior cerebellar peduncle
24	Middle cerebellar peduncle
25	Accessory nerve (n. XI)
26	Columns of fornix (divided)
27	Lamina affixa
28	Third ventricle
29	Pulvinar of thalamus
30	Inferior brachium
31	Frenulum veli
32	Superior medullary velum
33	Facial colliculus
34	Striae medullares and rhomboid fossa
35	Hypoglossal trigone
36	Stria terminalis and thalamostriate vein
37	Habenular trigone
38	Choroid plexus of lateral ventricle
39	Pineal body
40	Medial geniculate body
41	Cerebral peduncle
42	Choroid plexus of fourth ventricle
43	Clava

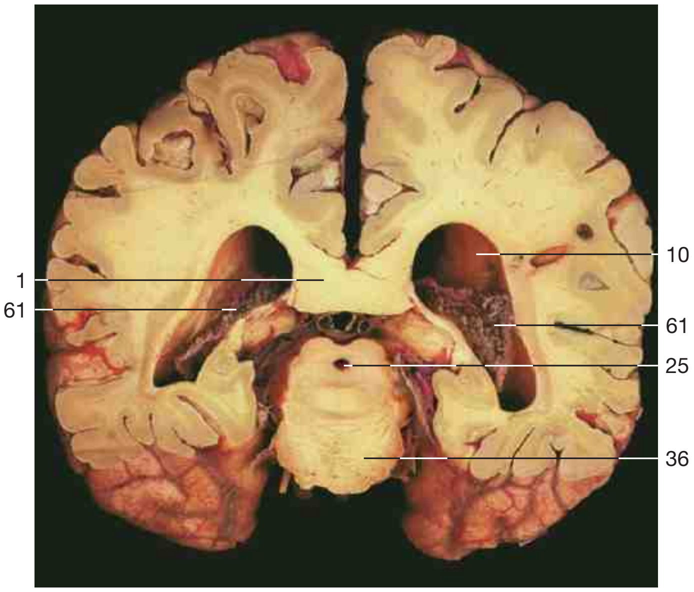


Coronal section through the brain at the level of the anterior commissure. Section 1.



Coronal section through the brain at the level of the third ventricle and the interthalamic adhesion. Section 2.

1 Corpus callosum
2 Head of caudate nucleus
3 Internal capsule
4 Putamen
5 Globus pallidus
6 Anterior commissure
7 Optic tract
8 Amygdaloid body
9 Inferior horn of lateral ventricle
10 Lateral ventricle
11 Septum pellucidum
12 Lobus insularis (insula)
13 External capsule
14 Column of fornix
15 Optic recess
16 Infundibulum
17 Thalamus
18 Claustrum
19 Lenticular ansa
20 Third ventricle and hypothalamus
21 Basilar artery and pons
22 Cortex of temporal lobe
23 Inferior colliculus
24 Superior colliculus
25 Cerebral aqueduct
26 Red nucleus
27 Substantia nigra
28 Cerebral peduncle
29 Trochlear nerve (n. IV)
30 Gray matter
31 Nucleus of oculomotor nerve
32 Fibers of oculomotor nerve (n. III)
33 Vermis of cerebellum
34 Fourth ventricle
35 Reticular formation
36 Pons and transverse pontine fibers
37 Emboliform nucleus
38 Dentate nucleus
39 Middle cerebellar peduncle
40 Choroid plexus
41 Hypoglossal nucleus at rhomboid fossa
42 Medial longitudinal fasciculus
43 Trigeminal nerve (n. V.)
44 Inferior olivary nucleus
45 Corticospinal fibers and arcuate fibers
46 Fourth ventricle with choroid plexus
47 Vestibular nuclei
48 Nucleus and tractus solitarius
49 Inferior cerebellar peduncle (restiform body)
50 Reticular formation
51 Medial lemniscus
52 Cuneate nucleus of Burdach
53 Central canal
54 Pyramidal tract
55 Flocculus of cerebellum
56 Cerebellar hemisphere with pia mater
57 "Arbor vitae" of cerebellum
58 Nucleus gracilis of Goll
59 Lateral recess of choroid plexus of fourth ventricle
60 Posterior inferior cerebellar artery
61 Choroid plexus of lateral ventricle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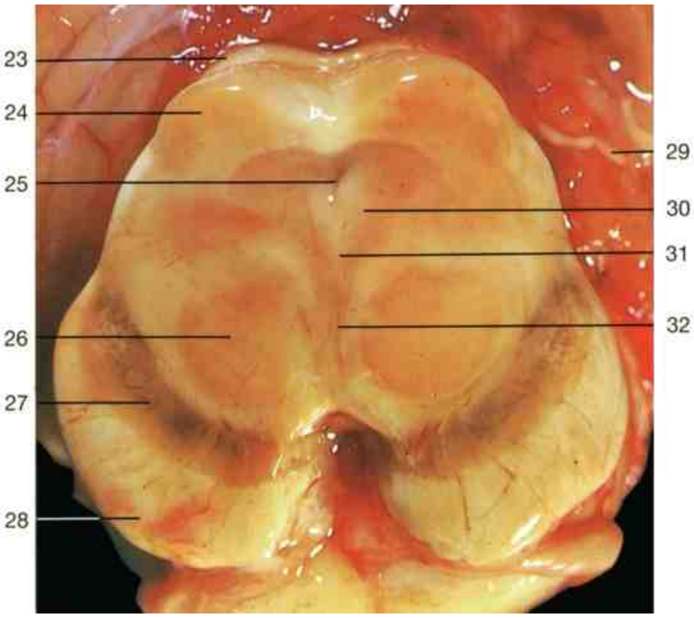
Coronal section through the brain at the level of the inferior colliculus (posterior aspect). Section 3.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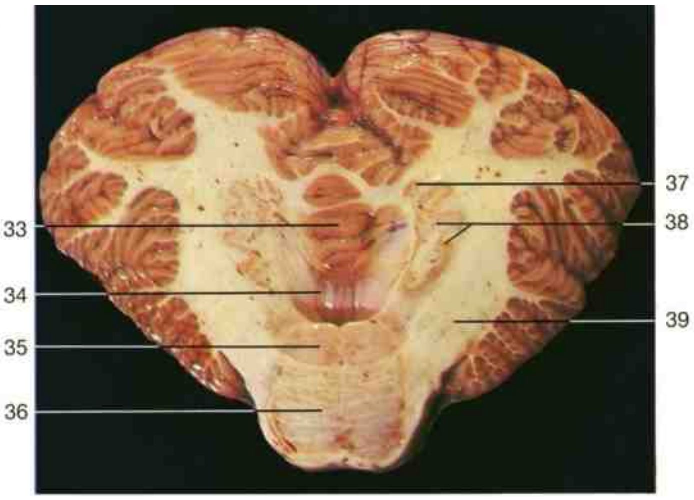
Cross section of the midbrain (mesencephalon) at the level of the superior colliculus (superior aspect). Section 4.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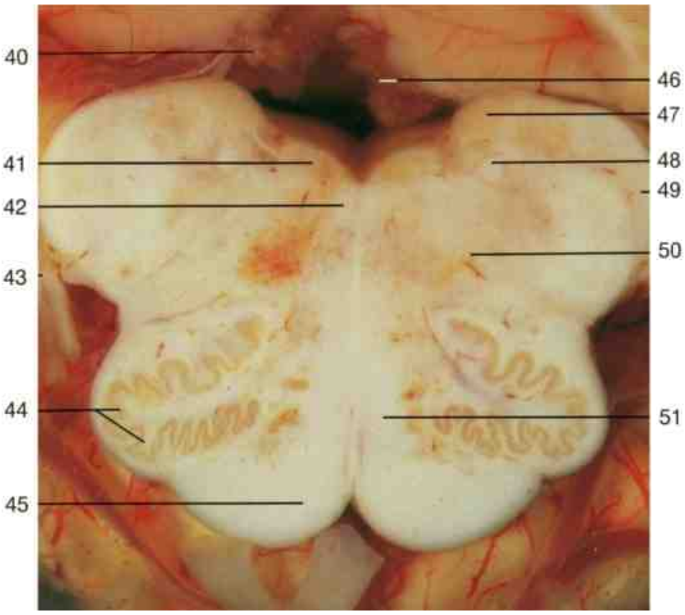
Cross section through the rhombencephalon at the level of the pons (inferior aspect). Section 5.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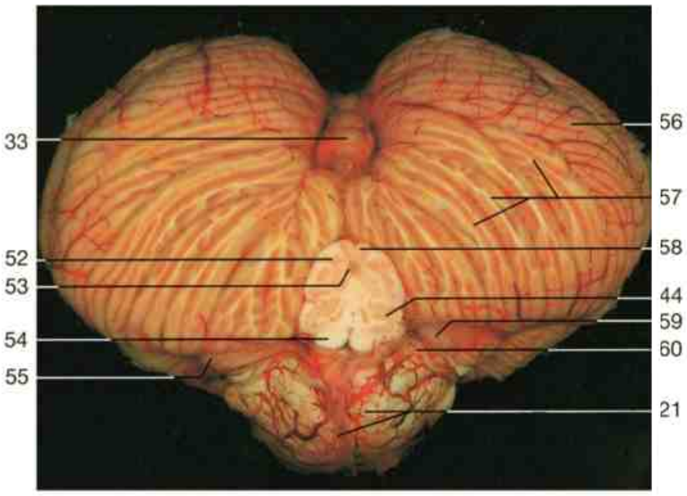
Cross section of the rhombencephalon at the level of the olive (inferior aspect). Section 6.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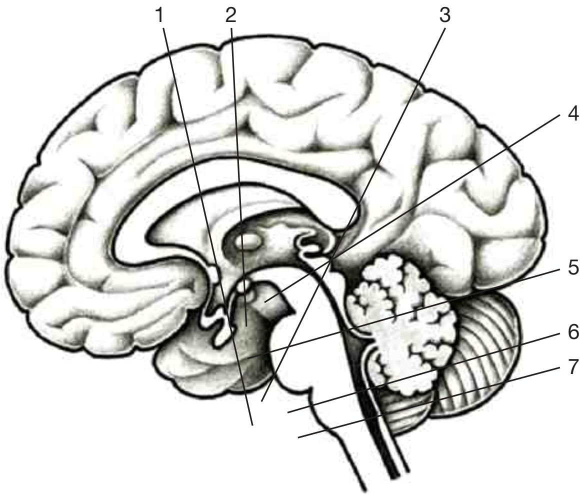
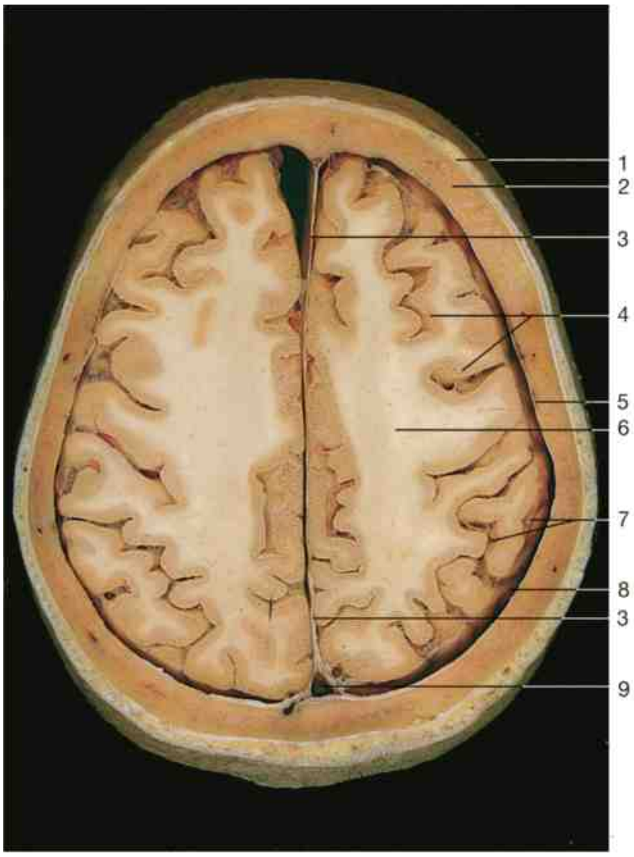
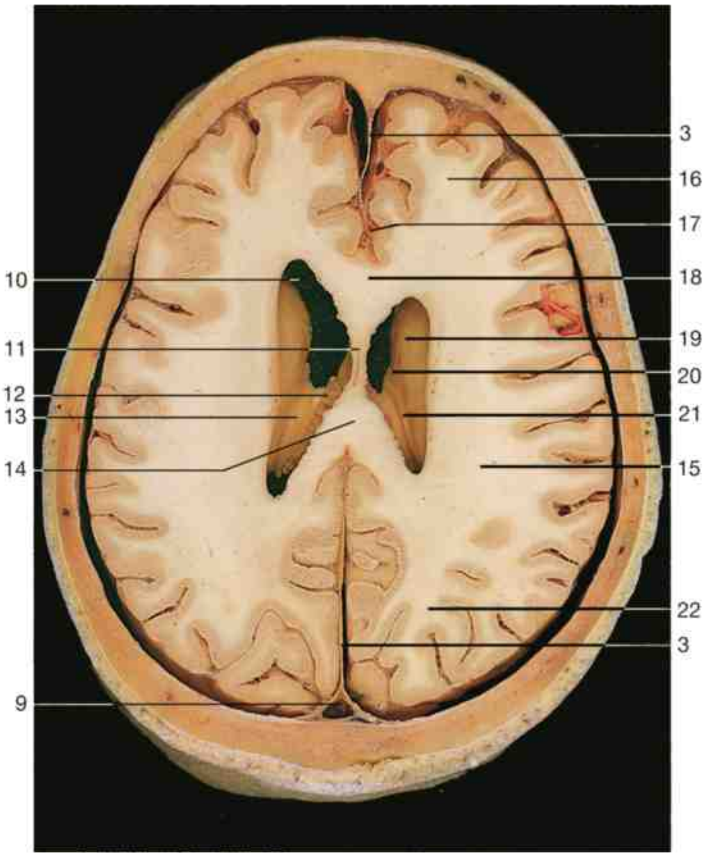
Cross section through medulla oblongata and cerebellum (inferior aspect). Section 7.



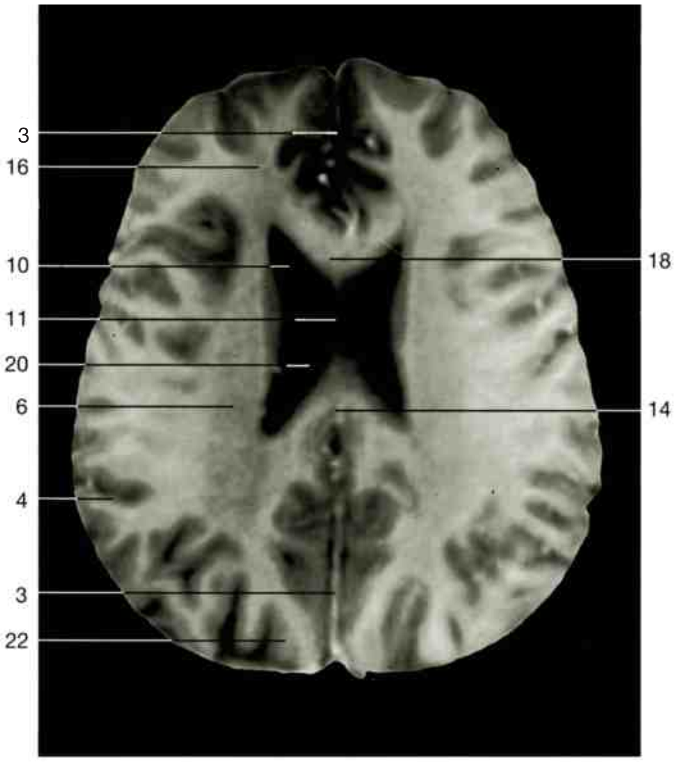
Right half of the brain. Levels of the sections are indicated.



Horizontal section through the head.
Section 1.



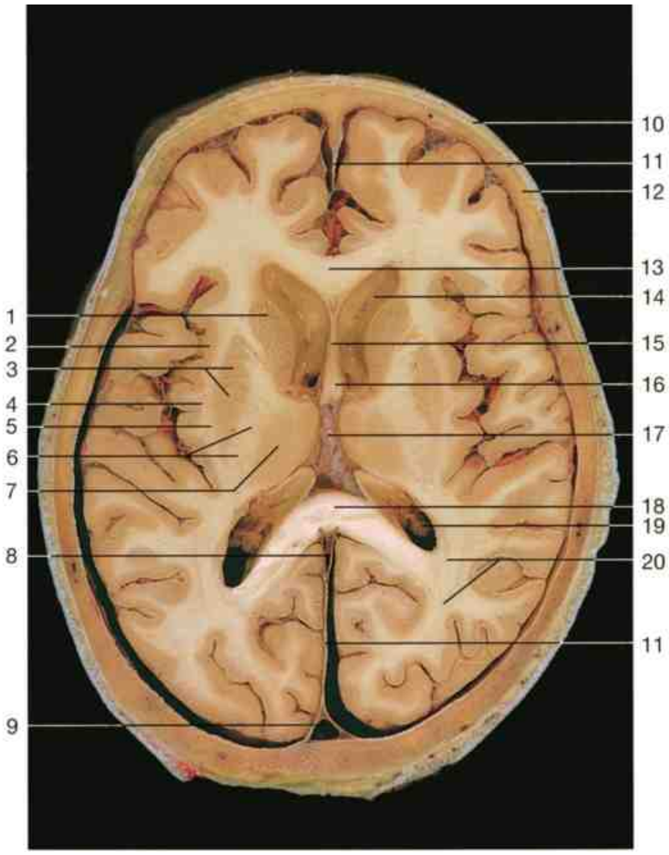
Horizontal section through the head.
Section 2.



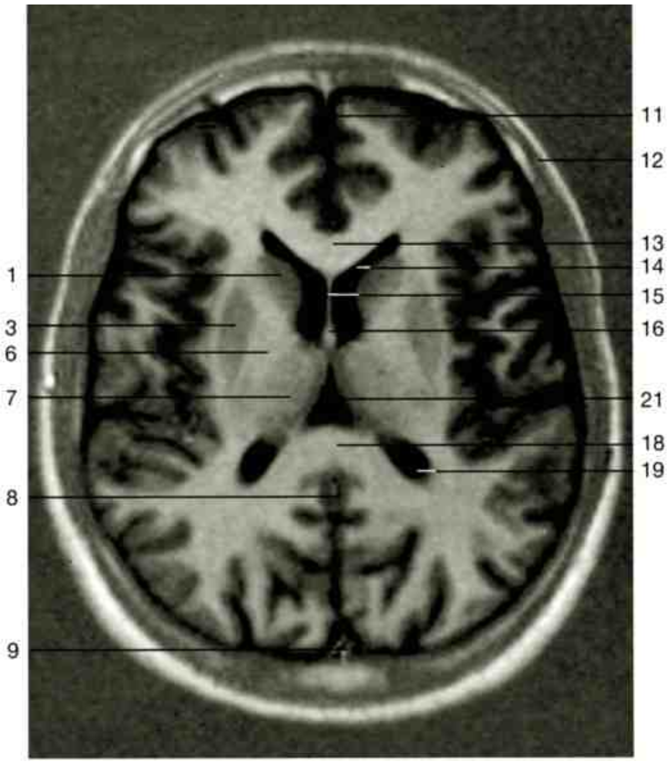
MRI scan of the human head at the level of section 2.

1 Skin of scalp
2 Calvaria (diploe of the skull)
3 Falx cerebri
4 Gray matter of brain (cortex)
5 Dura mater
6 White matter of brain
7 Arachnoid and pia mater with vessels
8 Subdural space (slightly expanded due to shrinkage of the brain)
9 Superior sagittal sinus
10 Anterior horn of lateral ventricle
11 Septum pellucidum
12 Choroid plexus
13 Thalamus
14 Splenium of corpus callosum
15 Parietal lobe
16 Frontal lobe
17 Anterior cerebral artery
18 Genu of corpus callosum
19 Caudate nucleus
20 Central part of lateral ventricle
21 Stria terminalis
22 Occipital lobe

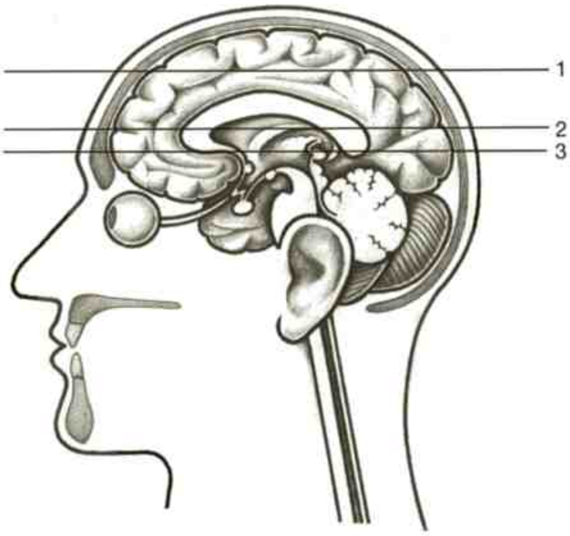
1	Caudate nucleus
2	Lobus insularis (insula)
3	Lentiform nucleus
4	Claustrum
5	External capsule
6	Internal capsule
7	Thalamus
8	Inferior sagittal sinus
9	Superior sagittal sinus
10	Skin of scalp
11	Falx cerebri
12	Calvaria (diploe of skull)
13	Genu of corpus callosum
14	Anterior horn of lateral ventricle
15	Septum pellucidum
16	Column of fornix
17	Choroid plexus of third ventricle
18	Splenium of corpus callosum
19	Entrance to inferior horn of lateral ventricle with choroid plexus
20	Optic radiation
21	Third ventricle



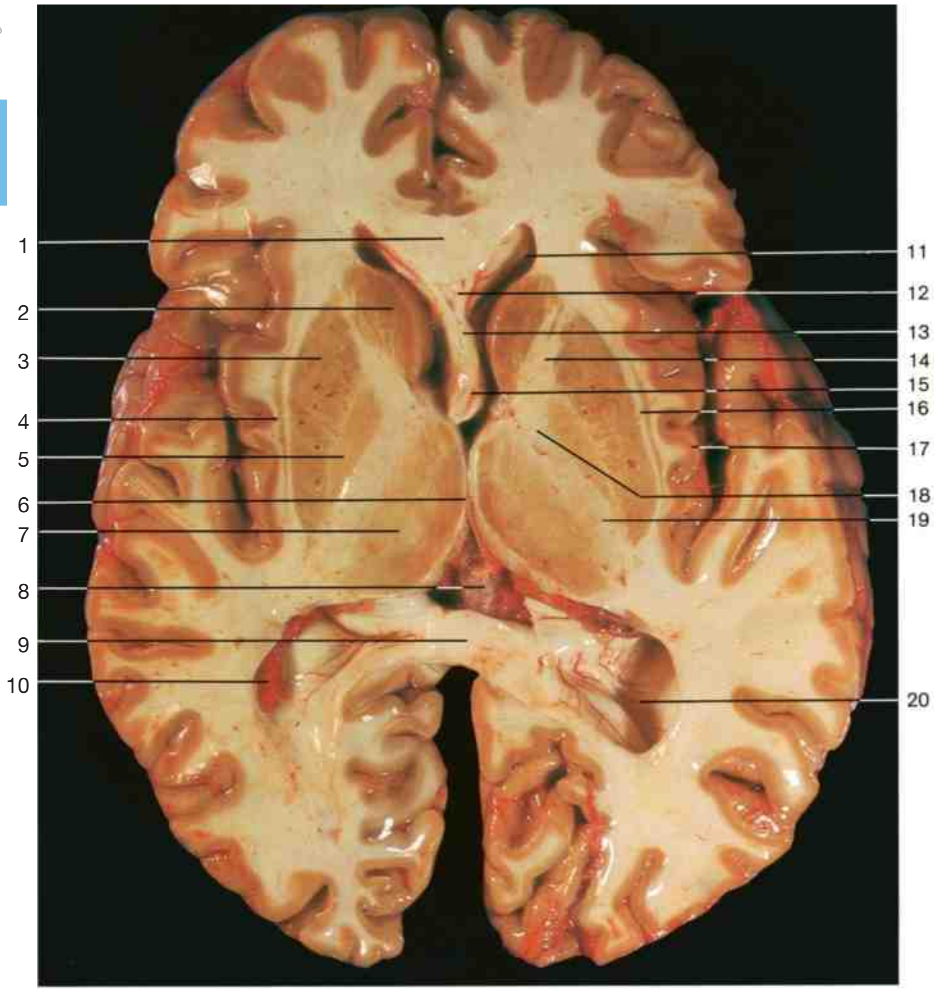
Horizontal section through the head at the level of third ventricle of internal capsule and neighboring nuclei. Section 3.



MRI scan at the corresponding level to the above figure. Section 3.

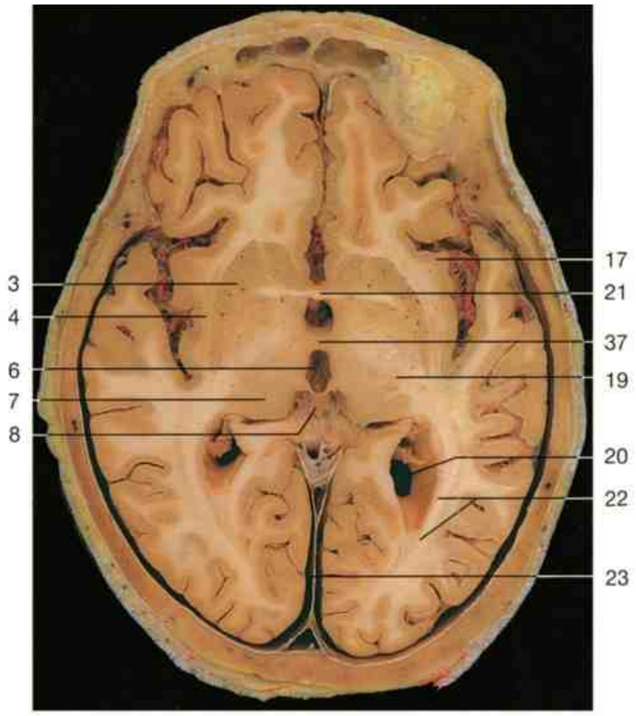


Sagittal section through the head. Levels of the horizontal sections are indicated.

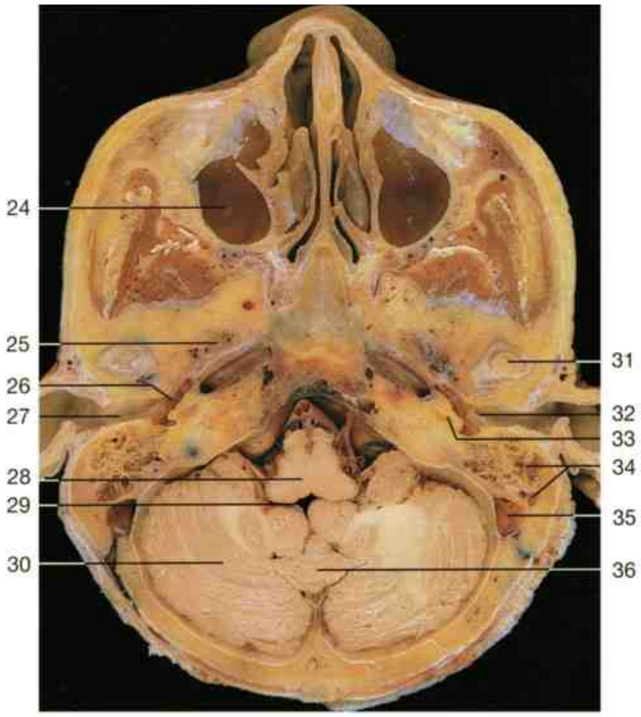


Horizontal section through the brain, showing the subcortical nuclei and internal capsule. Section 1.

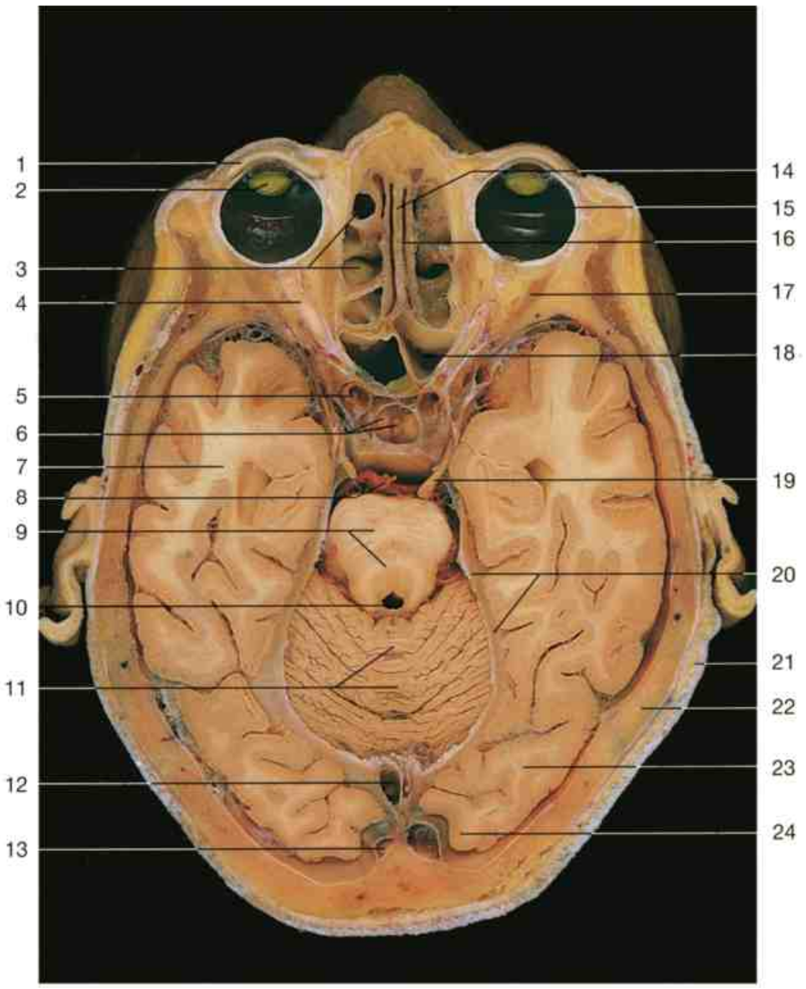
1	Genu of corpus callosum
2	Head of caudate nucleus
3	Putamen
4	Claustrum
5	Globus pallidus
6	Third ventricle
7	Thalamus
8	Pineal body
9	Splenium of corpus callosum
10	Choroid plexus of the lateral ventricle
11	Anterior horn of lateral ventricle
12	Cavity of septum pellucidum
13	Septum pellucidum
14	Anterior limb of internal capsule
15	Column of fornix
16	External capsule
17	Lobus insularis (insula)
18	Genu of internal capsule
19	Posterior limb of internal capsule
20	Posterior horn of lateral ventricle
21	Anterior commissure
22	Optic radiation
23	Falx cerebri
24	Maxillary sinus
25	Position of auditory tube
26	Tympanic cavity
27	External acoustic meatus
28	Medulla oblongata
29	Fourth ventricle
30	Cerebellum (left hemisphere)
31	Temporomandibular joint
32	Tympanic membrane
33	Base of cochlea
34	Mastoid air cells
35	Sigmoid sinus
36	Vermis of cerebellum
37	Intermediate mass



Horizontal section through the head. Section 2.

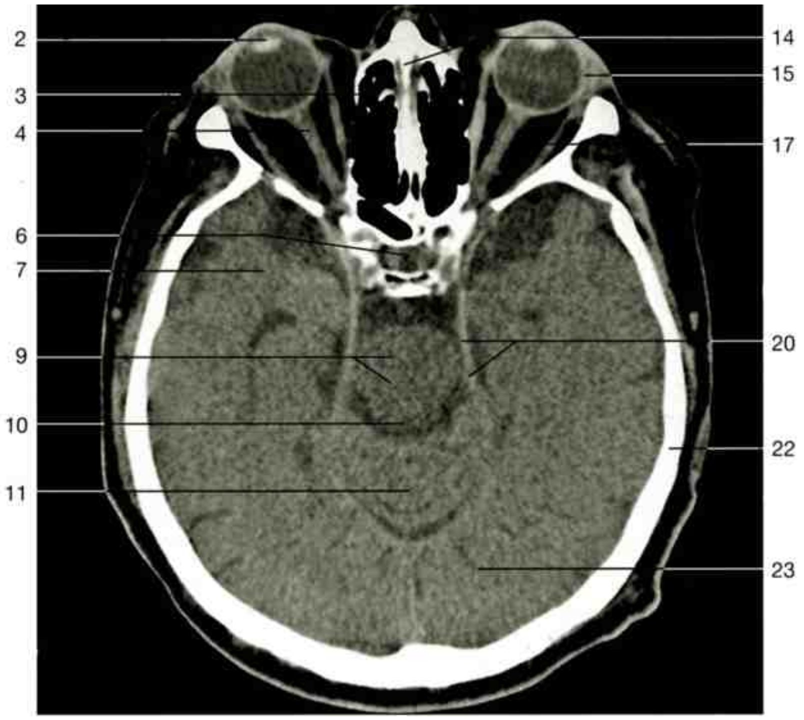


Horizontal section through the head. Section 4.

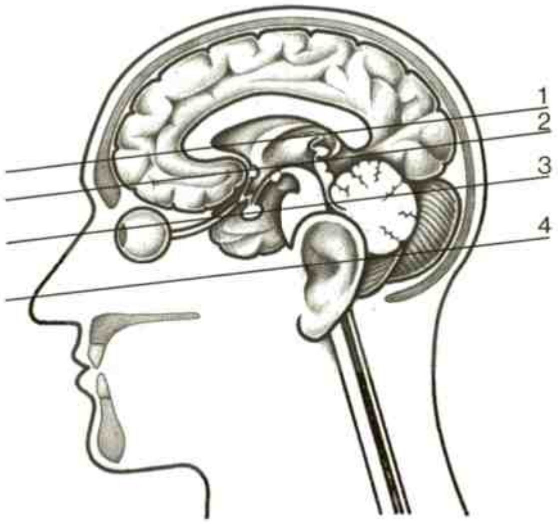


Horizontal section through the head. Section 3.

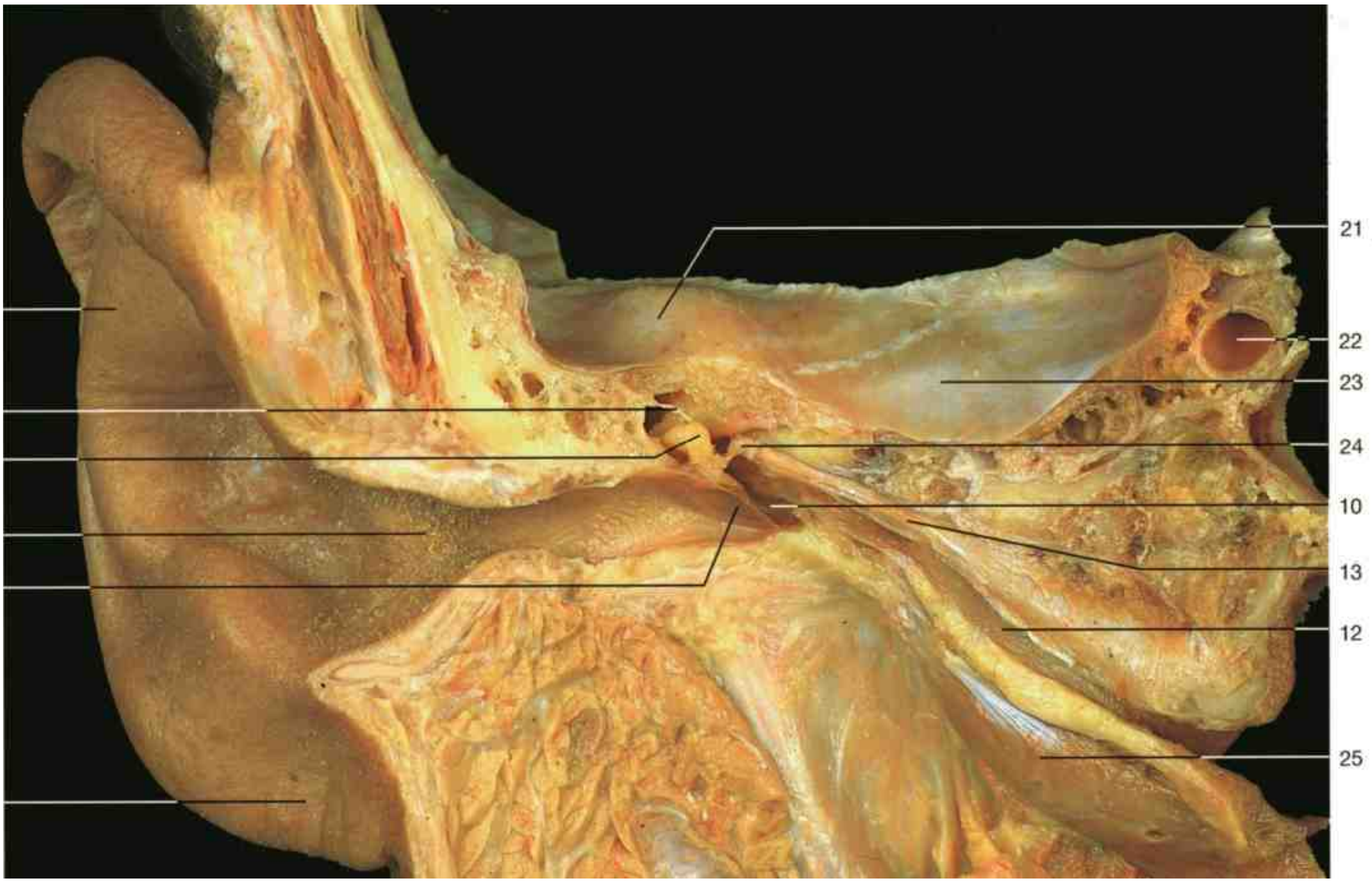
1 Upper lid (tarsal plate)
2 Lens
3 Ethmoidal sinus
4 Optic nerve (n. II)
5 Internal carotid artery
6 Infundibulum and pituitary gland
7 Temporal lobe
8 Basilar artery
9 Pons (cross section of brain stem)
10 Cerebral aqueduct (beginning of fourth ventricle)
11 Vermis of cerebellum
12 Straight sinus
13 Transverse sinus
14 Nasal septum
15 Eyeball (sclera)
16 Nasal cavity
17 Lateral rectus muscle
18 Sphenoidal sinus
19 Oculomotor nerve (n. III)
20 Tentorium of cerebellum
21 Skin of scalp
22 Calvaria
23 Occipital lobe
24 Striate cortex (visual cortex)



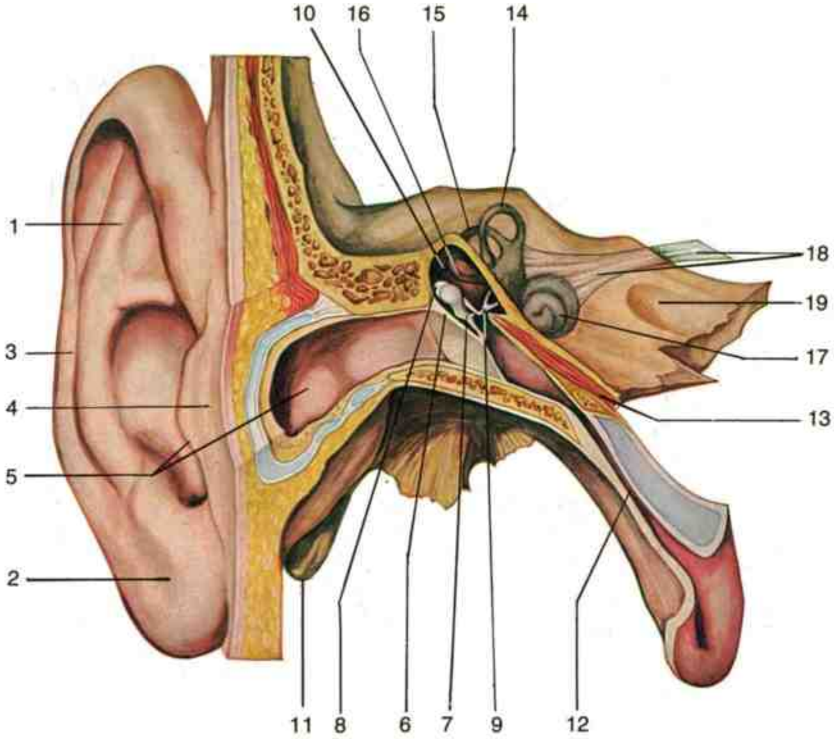
Horizontal section through the head. (CT scan.) Section 3.



Sagittal section through the head.
Levels of the horizontal sections are indicated.



Longitudinal section through the right temporal bone. The outer and middle ear and auditory ossicles and tube are shown (anterior aspect).



Right auditory and vestibular apparatus (anterior aspect). (Schematic drawing.)

Outer ear

1	Auricle
2	Lobule of auricle
3	Helix
4	Tragus
5	External acoustic meatus

Middle ear

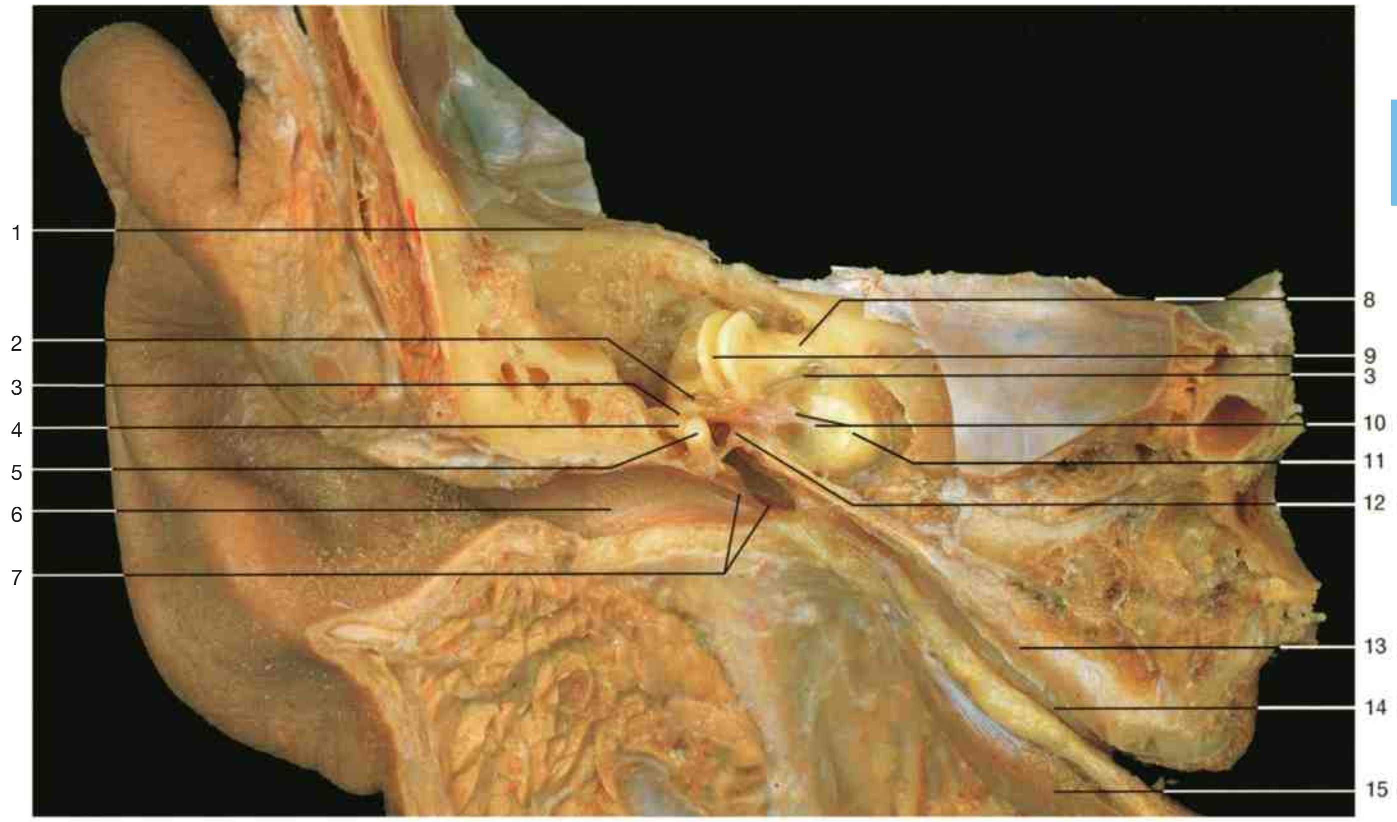
6	Tympanic membrane
7	Malleus
8	Incus
9	Stapes
10	Tympanic cavity
11	Mastoid process
12	Auditory tube
13	Tensor tympani muscle

Inner ear

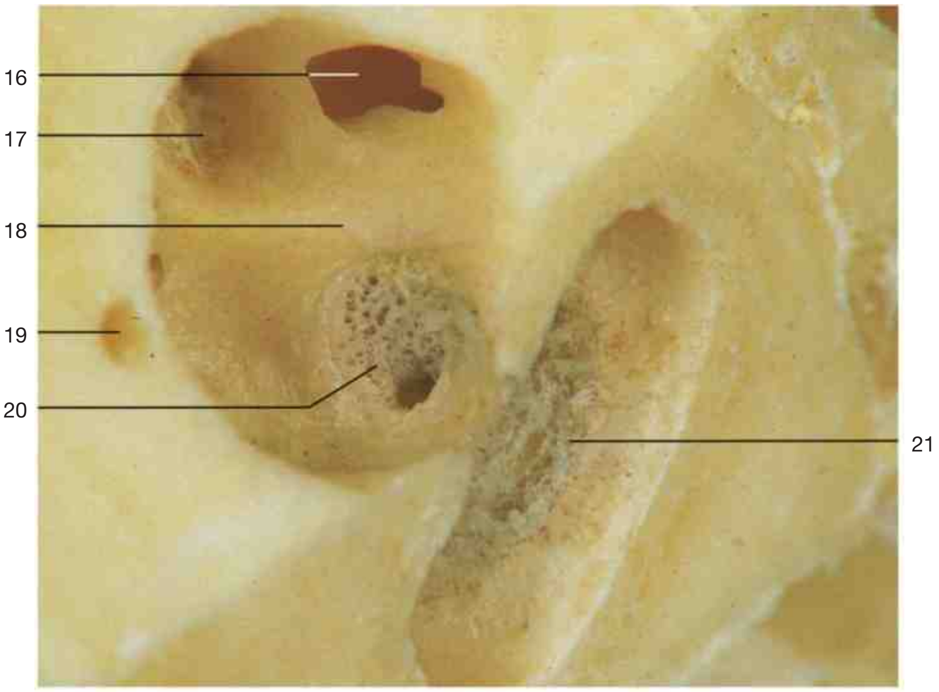
14	Anterior semicircular duct
15	Posterior semicircular duct
16	Lateral semicircular duct
17	Cochlea
18	Vestibulocochlear nerve
19	Petrous part of the temporal bone

Additional structures

20	Superior ligament of malleus
21	Arcuate eminence
22	Internal carotid artery
23	Anterior surface of pyramid with dura mater
24	Stapes
25	Levator veli palatini muscle

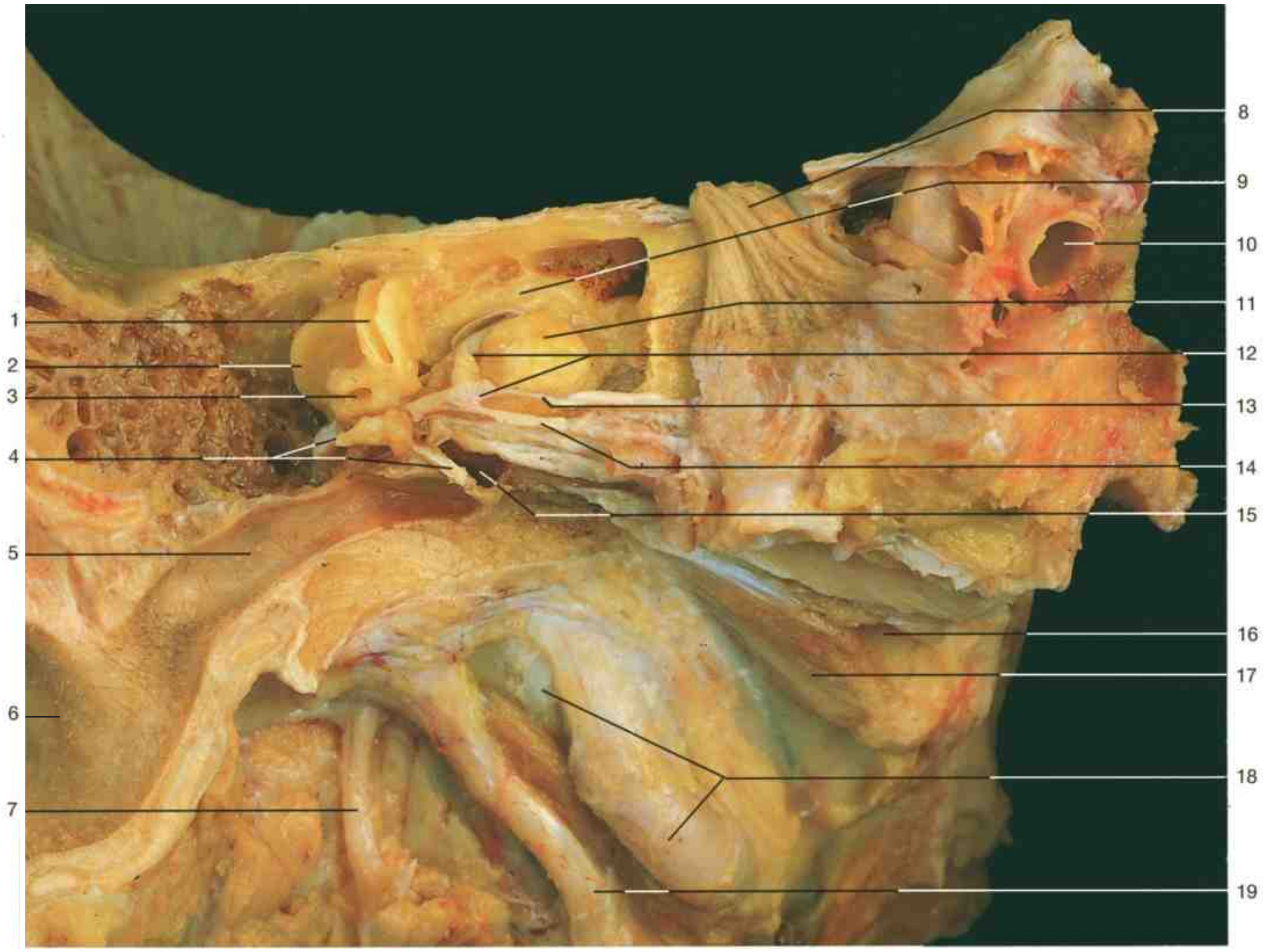


Longitudinal section through the right outer, middle, and inner ear. The cochlea and semicircular canals have been further dissected (anterior aspect).

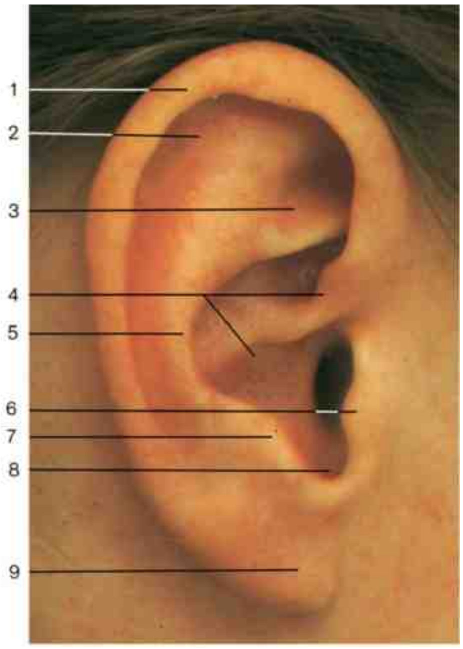


Internal acoustic meatus, left side. The bone was partly removed to show the bottom of the meatus.

1	Roof of tympanic cavity
2	Lateral osseous semicircular canal
3	Facial nerve
4	Incus
5	Malleus
6	External acoustic meatus
7	Tympanic cavity and tympanic membrane
8	Vestibulocochlear nerve
9	Anterior osseous semicircular canal
10	Geniculate ganglion and greater petrosal nerve
11	Cochlea
12	Stapes
13	Tensor tympani muscle
14	Auditory tube
15	Levator veli palatini muscle
16	Area of facial nerve
17	Superior vestibular area
18	Transverse crest
19	Foramen singulare
20	Foraminous spiral tract (outlet of cochlear part of vestibulocochlear nerve)
21	Base of cochlea



Longitudinal section through the outer, middle, and inner ear. Deeper dissection to display facial nerve and lesser and greater petrosal nerves (anterior aspect).



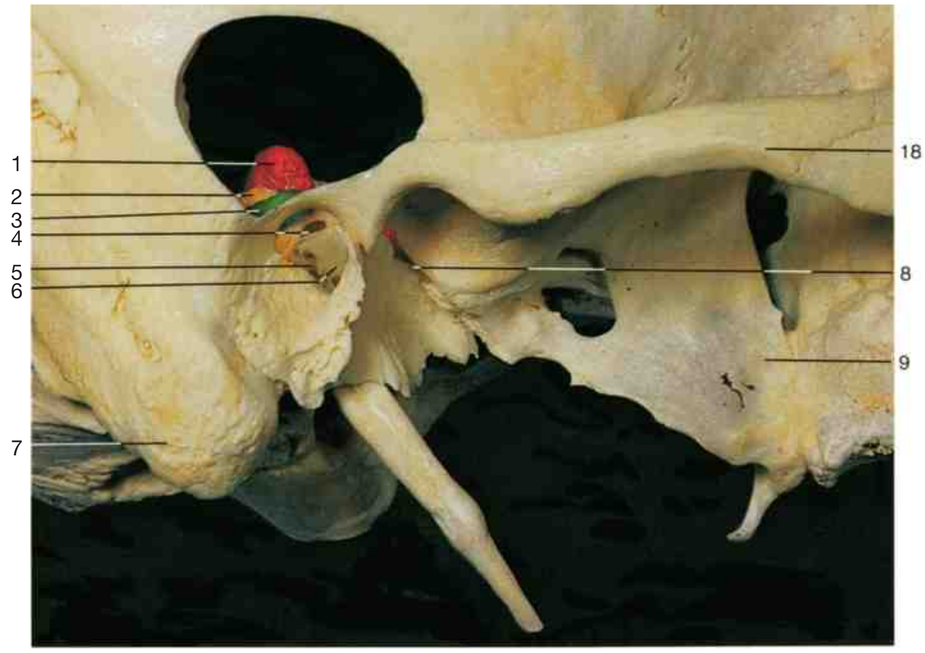
Right auricle (lateral aspect).

◁

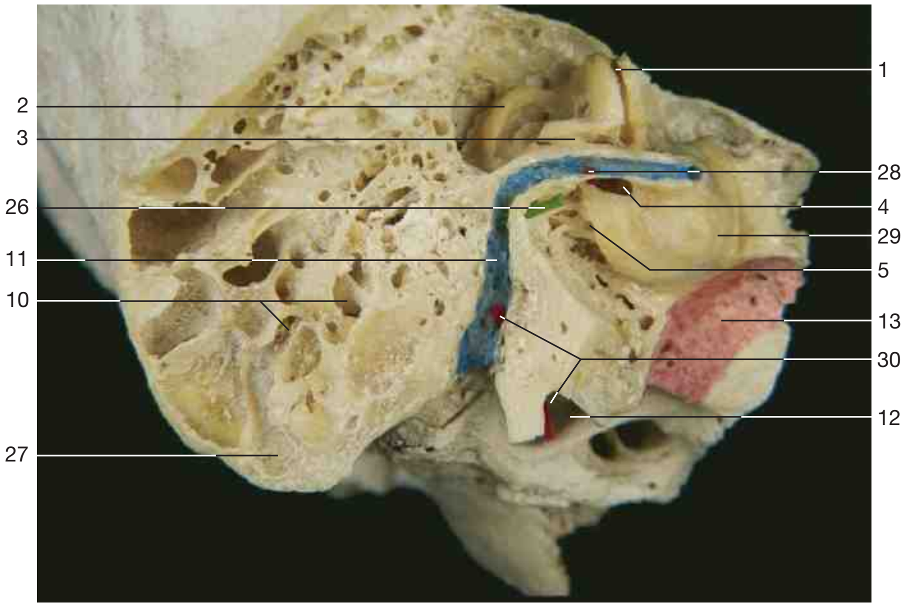
1 Helix
2 Scaphoid fossa
3 Triangular fossa
4 Concha
5 Antihelix
6 Tragus
7 Antitragus
8 Intertragic notch
9 Lobule

△

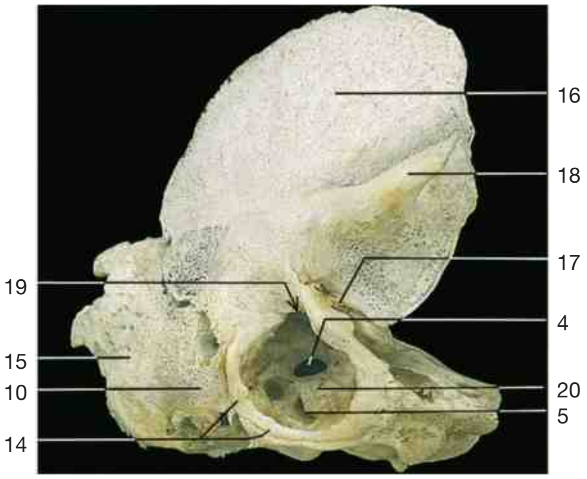
1 Anterior osseous semicircular canal (opened)
2 Posterior osseous semicircular canal
3 Lateral osseous semicircular canal (opened)
4 Facial nerve and chorda tympani
5 External acoustic meatus
6 Auricle
7 Facial nerve
8 Trigeminal nerve
9 Bony base of internal acoustic meatus
10 Internal carotid artery within cavernous sinus
11 Cochlea
12 Facial nerve with geniculate ganglion
13 Greater petrosal nerve
14 Lesser petrosal nerve
15 Tympanic cavity
16 Auditory tube
17 Levator veli palatini muscle
18 Internal carotid artery and internal jugular vein
19 Styloid process



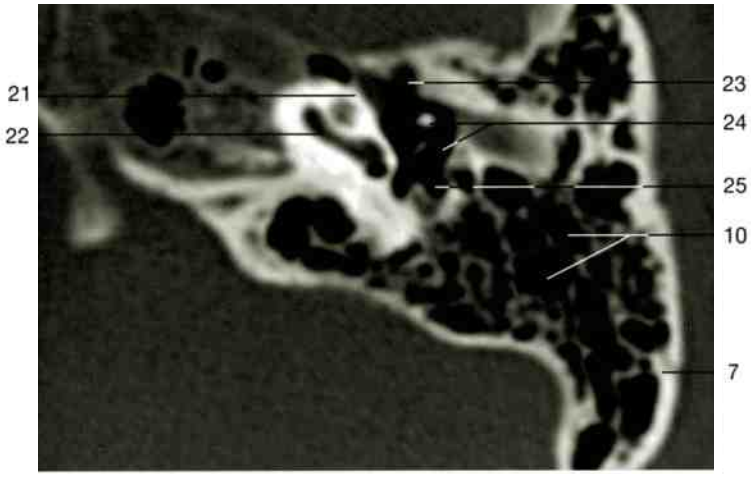
Right temporal bone (lateral aspect). Petrosquamous portion has been partly removed to display the semicircular canals.



Right temporal bone (lateral aspect). Mastoid air cells and facial canal had been opened. The three semicircular canals were dissected.

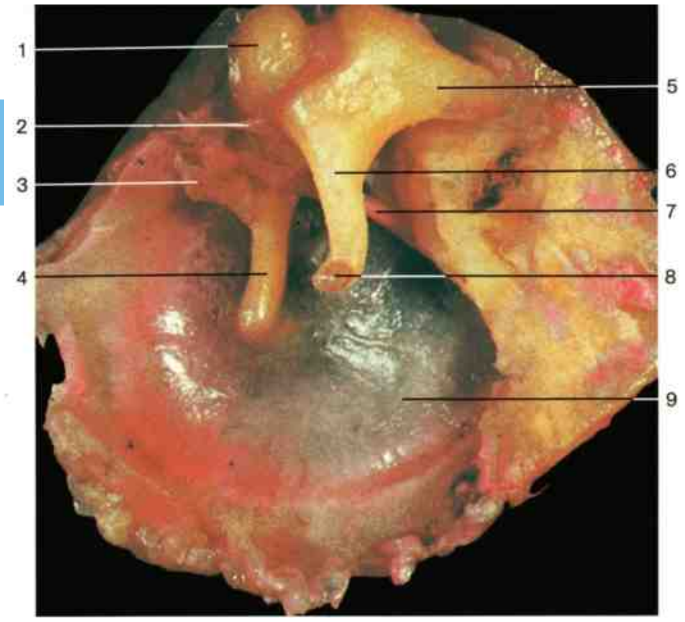


Right temporal bone of the newborn (lateral aspect).



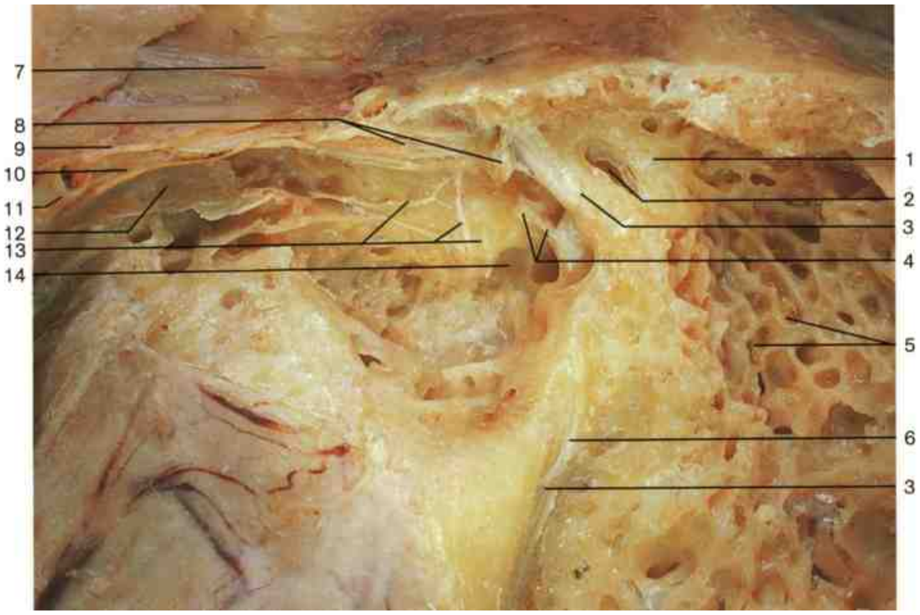
Frontal section through petrous part. (CT scan.)

1 Anterior semicircular canal (red)
2 Posterior semicircular canal (yellow)
3 Lateral or horizontal semicircular canal (green)
4 Fenestra vestibuli
5 Fenestra cochleae
6 Tympanic cavity
7 Mastoid process
8 Petrotympanic fissure (red probe: chorda tympani)
9 Lateral pterygoid plate
10 Mastoid air cells
11 Facial canal (blue)
12 Foramen ovale
13 Carotid canal (red)
14 Tympanic ring
15 Petromastoid part of temporal bone
16 Squamous part of temporal bone
17 Squamomastoid suture
18 Zygomatic process of temporal bone
19 Incisure of tympanic ring
20 Promontory
21 Apex of cochlea (cupula)
22 Spiral canal of cochlea at base of cochlea
23 Epitympanic recess
24 Auditory ossicles and tympanic cavity
25 Hypotympanic recess
26 Canaliculus chordae tympani (green probe)
27 Mastoid process
28 Canaliculus for stapedius nerve (red)
29 Cochlea
30 Canaliculus mastoideus (red probe)



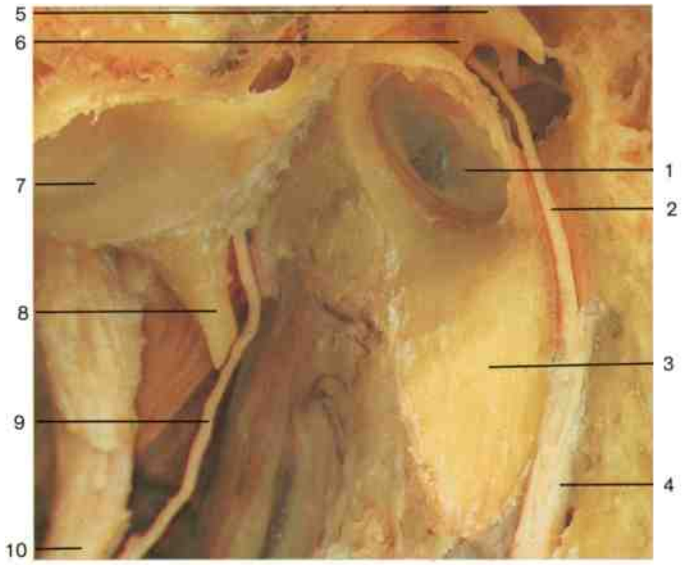
1 Head of malleus
2 Anterior ligament of malleus
3 Tendon of tensor tympani muscle
4 Handle of malleus
5 Short crus of incus
6 Long crus of incus
7 Chorda tympani
8 Lenticular process
9 Tympanic membrane

Tympanic membrane with malleus and incus (internal aspect; right side).



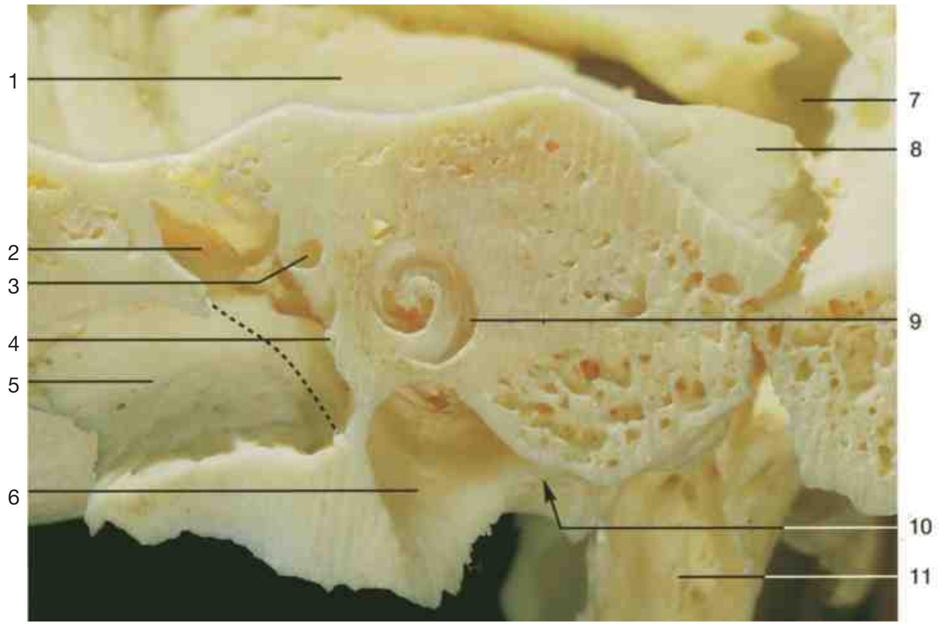
1 Tympanic antrum
2 Lateral semicircular canal (opened)
3 Facial canal
4 Stapes with tendon of stapedius
5 Mastoid air cells
6 Chorda tympani (intracranial part)
7 Greater petrosal nerve
8 Tensor tympani muscle (processus cochleariformis)
9 Lesser petrosal nerve
10 Anterior tympanic artery
11 Middle meningeal artery
12 Auditory tube
13 Promontory with tympanic plexus
14 Fenestra cochleae

Tympanic cavity, medial wall. External acoustic meatus and lateral wall of tympanic cavity together with incus. Malleus and tympanic membrane have been removed; mastoid air cells are opened (left side).

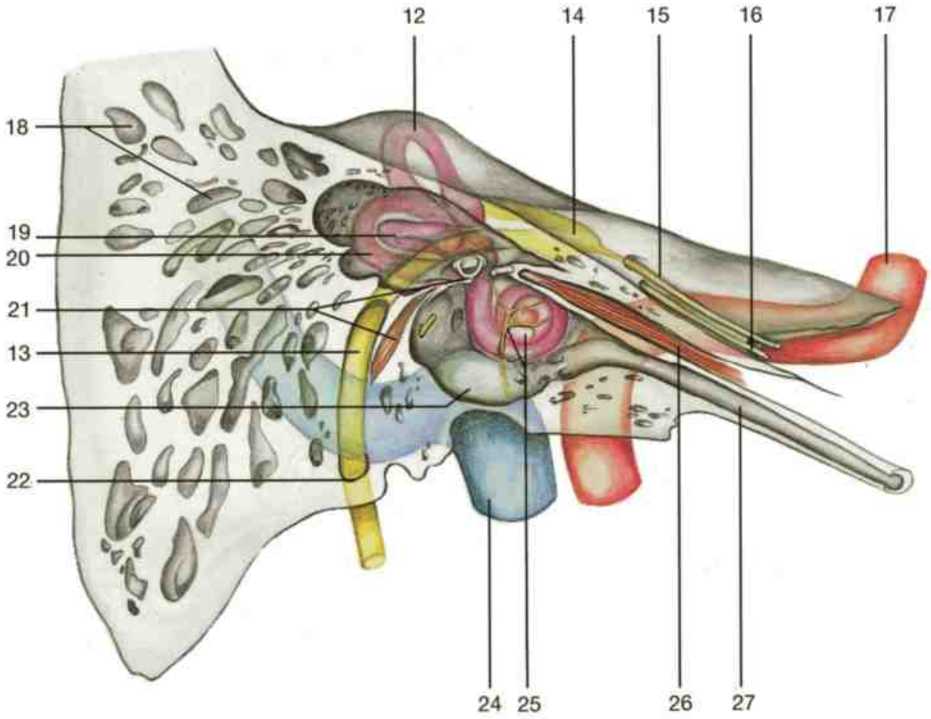


1 Tympanic membrane
2 Chorda tympani (intracranial part)
3 Floor of the external acoustic meatus
4 Facial nerve and facial canal
5 Incus
6 Head of malleus
7 Mandibular fossa
8 Spine of sphenoid
9 Chorda tympani (extracranial part)
10 Styloid process

Tympanic membrane (lateral aspect). External acoustic meatus and facial canal have been opened to expose the chorda tympani (magn. ~1.5×) (left side).

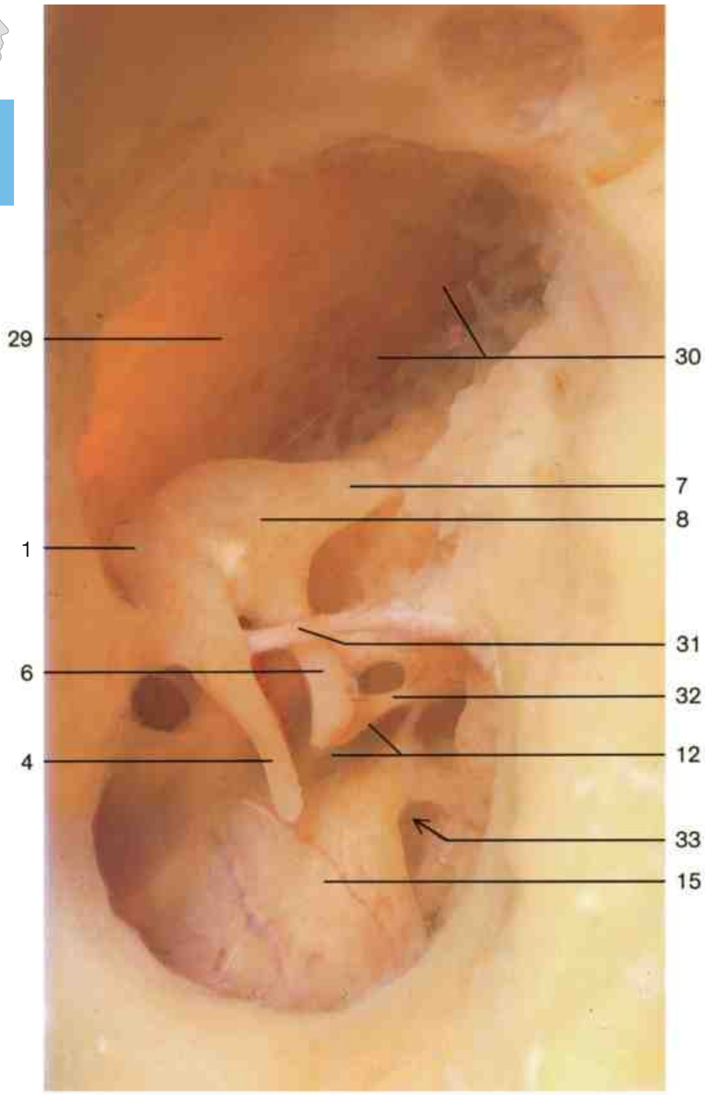


Frontal section through the petrous part of the left temporal bone at the level of the cochlea (posterior aspect). Position of tympanic membrane indicated by dotted line.

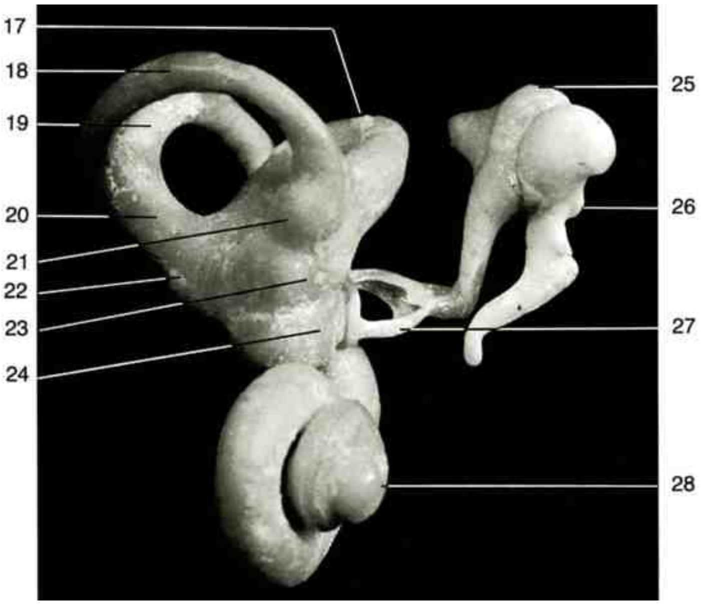


Medial wall of tympanic cavity and its relation to neighboring structures of the inner ear, facial nerve, and blood vessels (schematic drawing). Frontal section through the right temporal bone (anterior aspect).

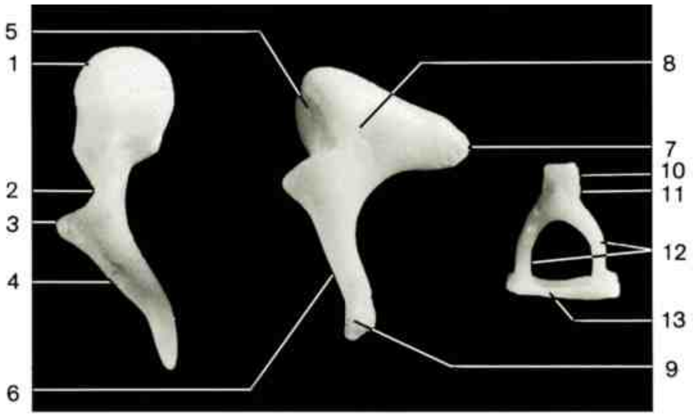
1 Anterior surface of the pyramid
2 Mastoid antrum
3 Lateral semicircular canal
4 Cochleariform process
5 External acoustic meatus
6 Jugular fossa
7 Foramen lacerum
8 Apex of petrous part
9 Position of cochlea (modiolus with crista spiralis ossea)
10 Carotid canal
11 Pterygoid process
12 Anterior semicircular duct
13 Facial nerve
14 Geniculate ganglion
15 Greater petrosal nerve
16 Lesser petrosal nerve
17 Internal carotid artery
18 Mastoid air cells
19 Lateral semicircular duct
20 Posterior semicircular duct
21 Stapes with stapedius muscle
22 Stylomastoid foramen
23 Inferior recess of tympanic cavity (hypotympanon)
24 Internal jugular vein
25 Promontory with tympanic plexus (position of cochlea)
26 Tensor muscle of tympanum
27 Auditory tube



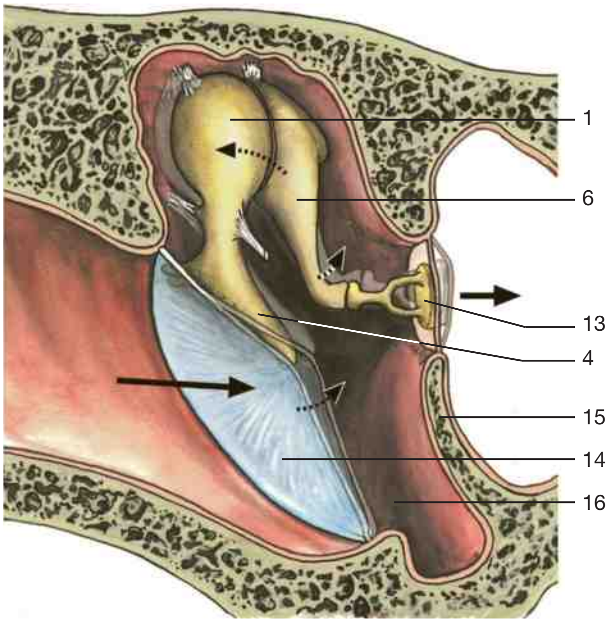
Tympanic cavity with malleus, incus, and stapes, left side (lateral aspect). Tympanic membrane removed, mastoid antrum opened.



Chain of auditory ossicles in connection with the inner ear, left side (antero-lateral aspect).



Auditory ossicles (isolated).



Position and movements of the auditory ossicles (schematic drawing).

Malleus
1 Head
2 Neck
3 Lateral process
4 Handle

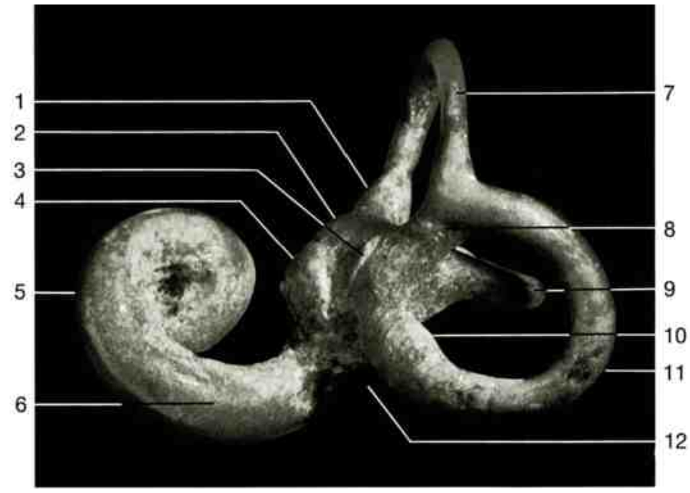
Incus
5 Articular facet for malleus
6 Long crus
7 Short crus
8 Body
9 Lenticular process

Stapes
10 Head
11 Neck
12 Anterior and posterior crura
13 Base

Walls of tympanic cavity
14 Tympanic membrane
15 Promontory
16 Hypotympanic recess of tympanic cavity

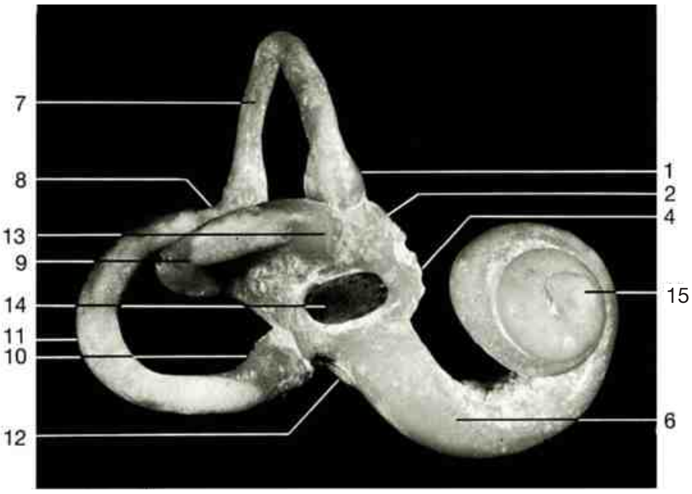
Internal ear (labyrinth)
17 Lateral semicircular duct
18 Anterior semicircular duct
19 Posterior semicircular duct
20 Common crus
21 Ampulla
22 Beginning of endolymphatic duct
23 Utricular prominence
24 Saccular prominence
25 Incus
26 Malleus
27 Stapes
28 Cochlea

Tympanic cavity
29 Epitympanic recess
30 Mastoid antrum
31 Chorda tympani
32 Tendon of stapedius muscle
33 Round window (fenestra cochleae)

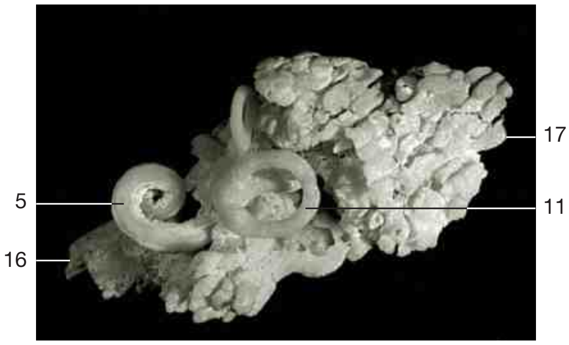


Cast of the right labyrinth (postero-medial aspect).

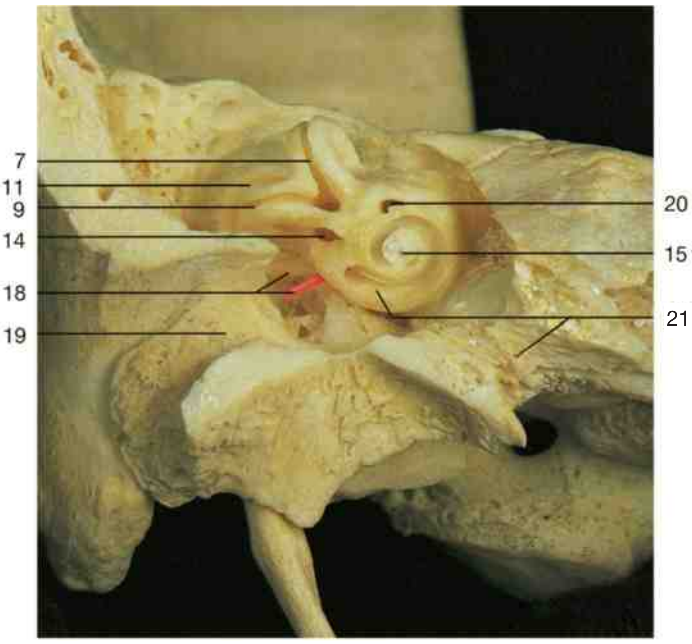
1. Ampulla (anterior semicircular canal)
2. Elliptical recess
3. Aqueduct of the vestibule
4. Spherical recess
5. Cochlea
6. Base of cochlea
7. Anterior semicircular canal
8. Crus commune or common limb
9. Lateral semicircular canal
10. Posterior bony ampulla
11. Posterior semicircular canal (posterior canal)
12. Fenestra cochleae
13. Bony ampulla
14. Fenestra vestibuli
15. Cupula of cochlea
16. External acoustic meatus
17. Mastoid air cells
18. Tympanic cavity and fenestra cochleae (probe)
19. External acoustic meatus
20. Facial canal
21. Base of cochlea and musculotubal canal
22. Malleus and incus
23. Stapes
24. Tympanic membrane
25. Tympanic cavity
26. Aqueduct of cochlea
27. Endolymphatic sac
28. Endolymphatic duct
29. Macula of utricle
30. Macula of saccule



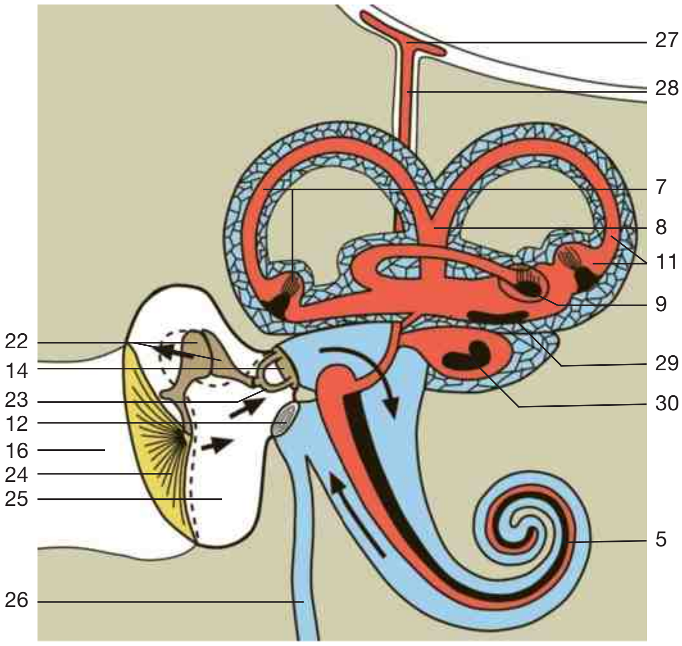
Cast of the right labyrinth (lateral aspect).



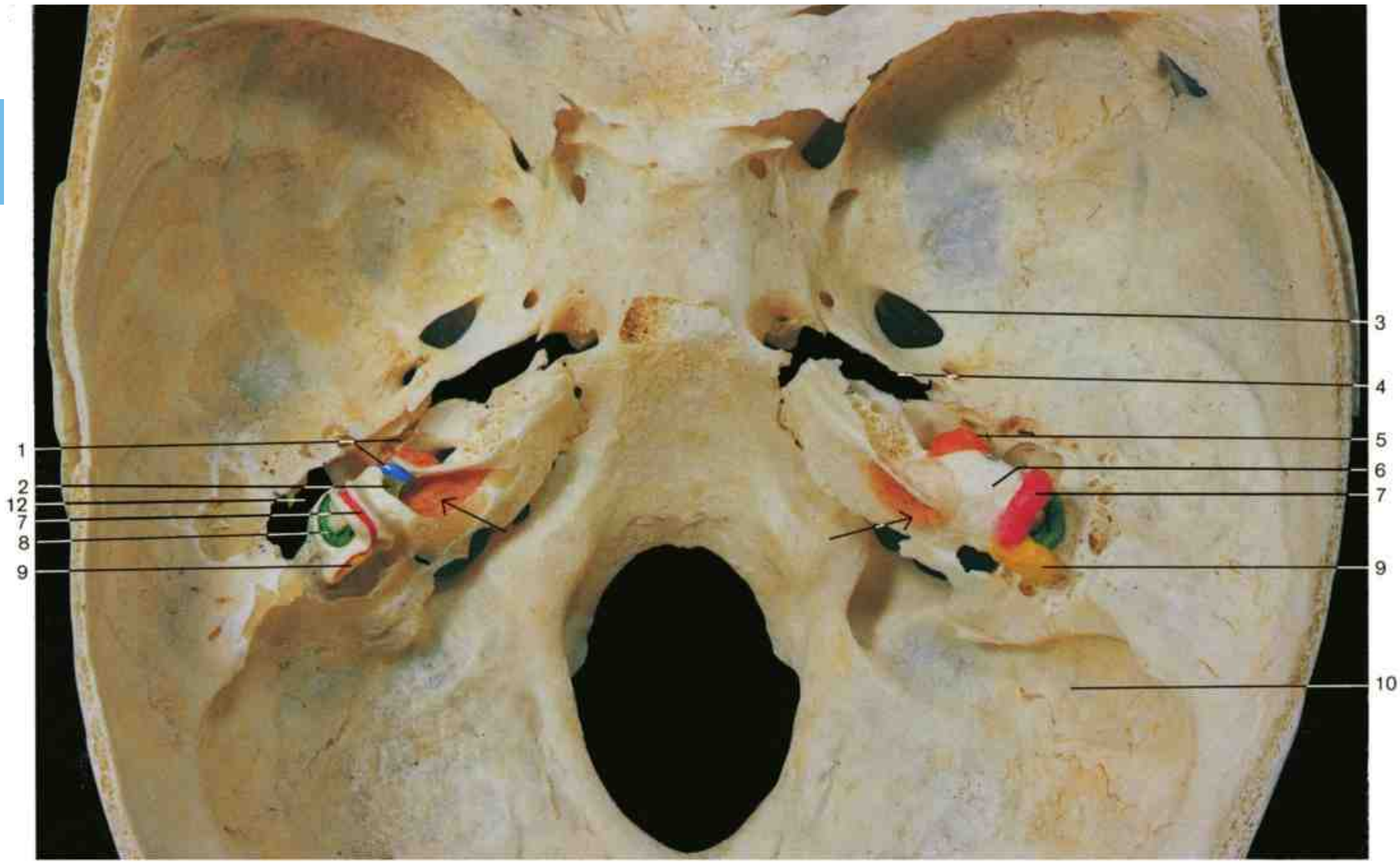
Cast of the labyrinth and mastoid cells. Life size (posterior aspect).



Dissection of bony labyrinth in situ. Semicircular canals and cochlear duct opened.

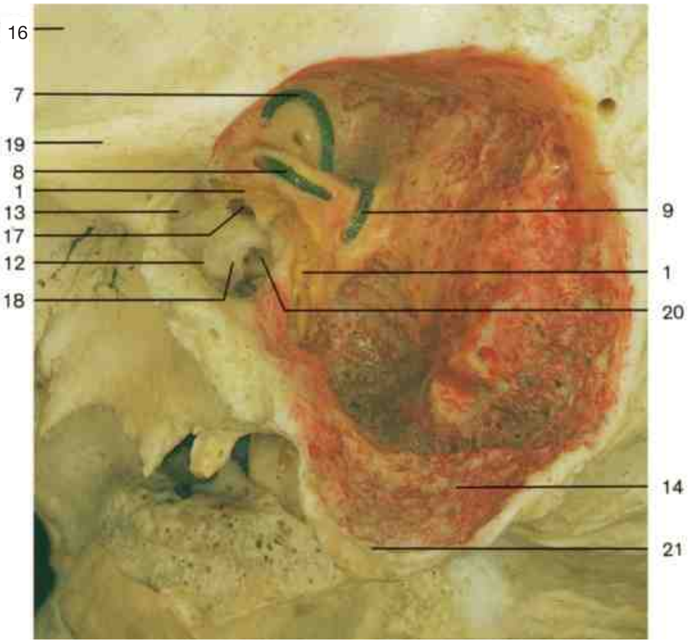


Auditory and vestibular apparatus. Arrows = direction of sound waves; blue = perilymphatic ducts (schematic drawing; from Lütjen-Drecoll, Rohen, Innenansichten des menschlichen Körpers, 2010).

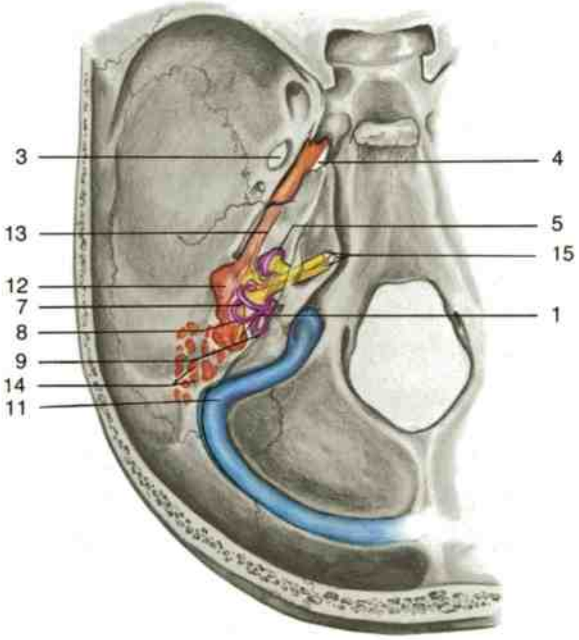


Bony labyrinth, petrous part of the temporal bone (from above). At left: semicircular canals opened; at right: closed. Arrows: internal acoustic meatus.

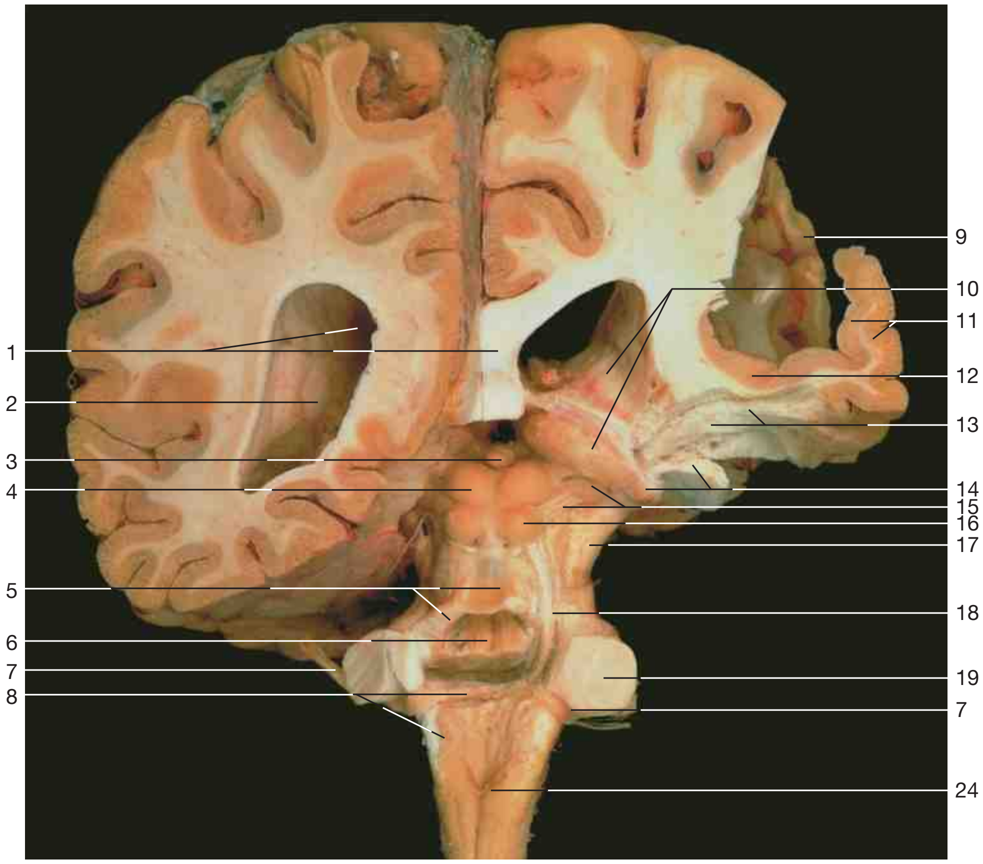
1 Facial canal and semicanal of auditory tube
2 Superior vestibular area
3 Foramen ovale
4 Foramen lacerum
5 Cochlea
6 Vestibule
7 Anterior semicircular canal
8 Lateral semicircular canal
9 Posterior semicircular canal
10 Groove for sigmoid sinus
11 Sigmoid sinus
12 Tympanic cavity
13 Auditory tube
14 Mastoid air cells
15 Facial and vestibulocochlear nerves
16 Temporal fossa
17 Fenestra vestibuli
18 Promontory
19 Zygomatic process
20 Fenestra cochleae
21 Mastoid process



Bony labyrinth (left lateral aspect). Temporal and tympanic bone partly removed, semicircular canals opened.

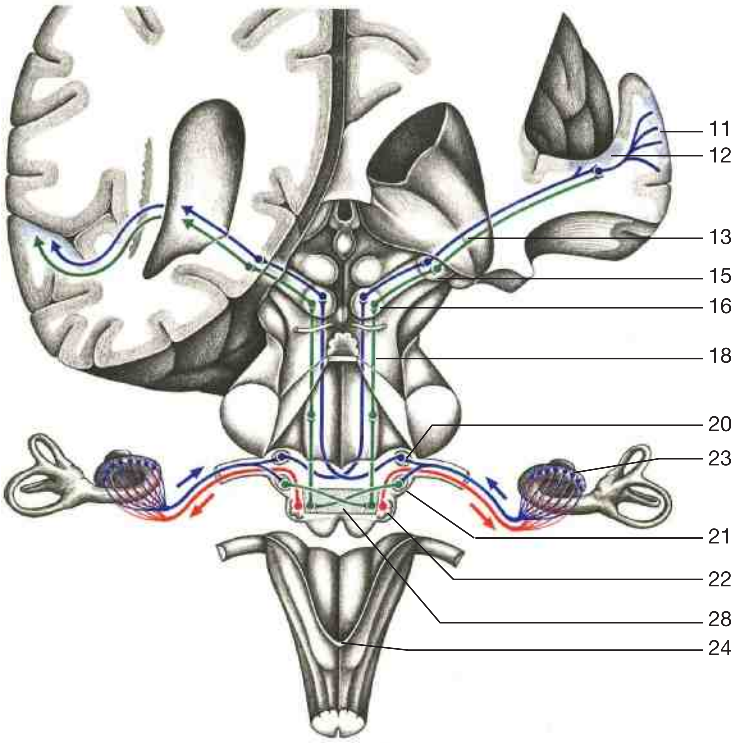


Internal ear. Diagram showing the position of the membranous labyrinth and the tympanic cavity.

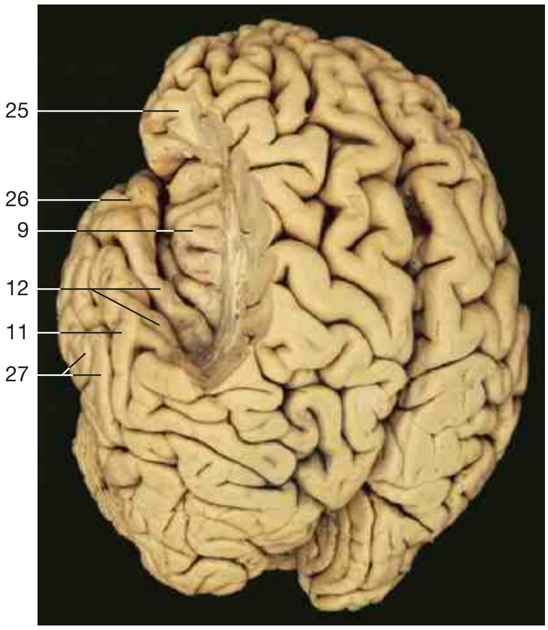


Dissection of the brain stem showing the auditory pathway. Cerebellum and posterior part of the two hemispheres have been removed (dorsal aspect).

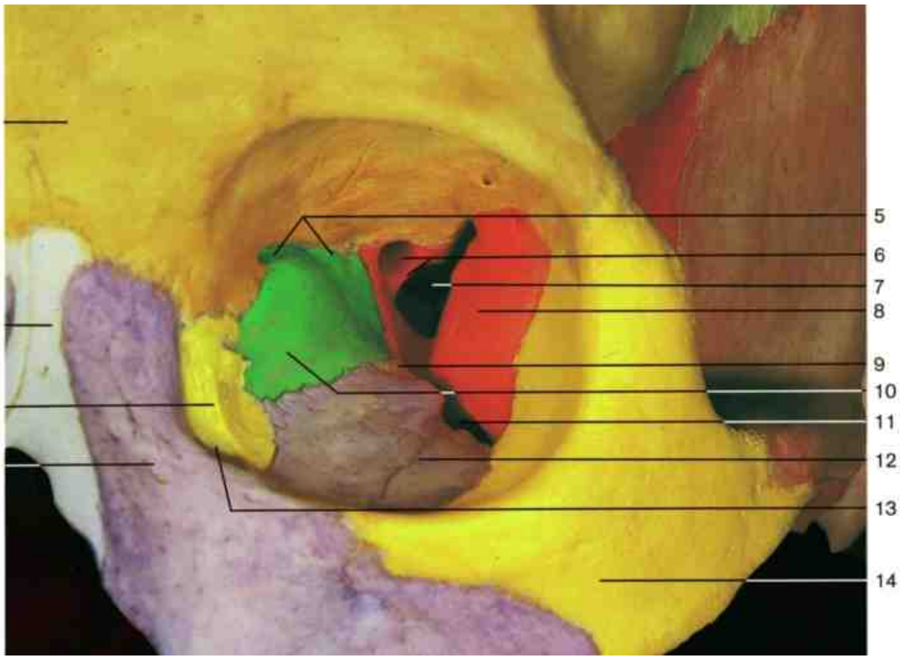
1	Left lateral ventricle and corpus callosum
2	Thalamus
3	Pineal gland (epiphysis)
4	Superior colliculus
5	Superior medullary velum and superior cerebellar peduncle
6	Rhomboid fossa
7	Vestibulocochlear nerve (n. VIII)
8	Dorsal acoustic striae and inferior cerebellar peduncle
9	Insular lobe
10	Caudate nucleus and thalamus
11	Temporal lobe (superior temporal gyrus) (area of acoustic centers)
12	Transverse temporal gyri of Heschl (area of primary acoustic centers)
13	Acoustic radiation of internal capsule
14	Lateral geniculate body and optic radiation (cut)
15	Medial geniculate body and brachium of inferior colliculus
16	Inferior colliculus
17	Cerebral peduncle
18	Lateral lemniscus
19	Middle cerebellar peduncle
20	Dorsal (posterior) cochlear nucleus
21	Ventral (anterior) cochlear nucleus
22	Inferior olive with olivocochlear tract of Rasmussen (red)
23	Ganglion spirale
24	Obex
25	Frontal lobe
26	Temporal lobe
27	Middle temporal gyrus (area of tertiary acoustic centers)
28	Trapezoid body



Auditory pathway (schematic drawing, compare with figure above). Red = descending (efferent) pathway (olivocochlear tract of Rasmussen); green and blue = ascending (afferent) pathways.

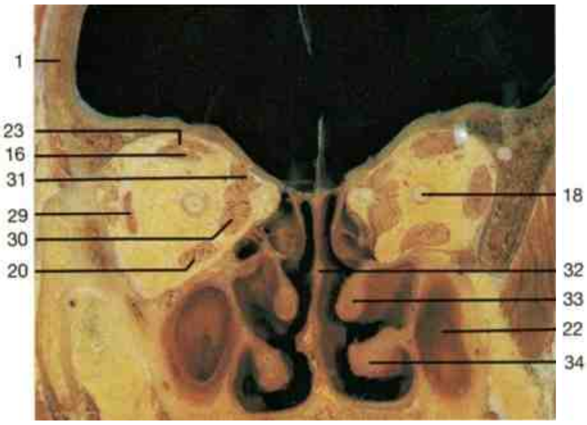


Auditory areas in the left hemisphere (supero-lateral aspect). Parts of the frontal and parietal lobes have been removed.

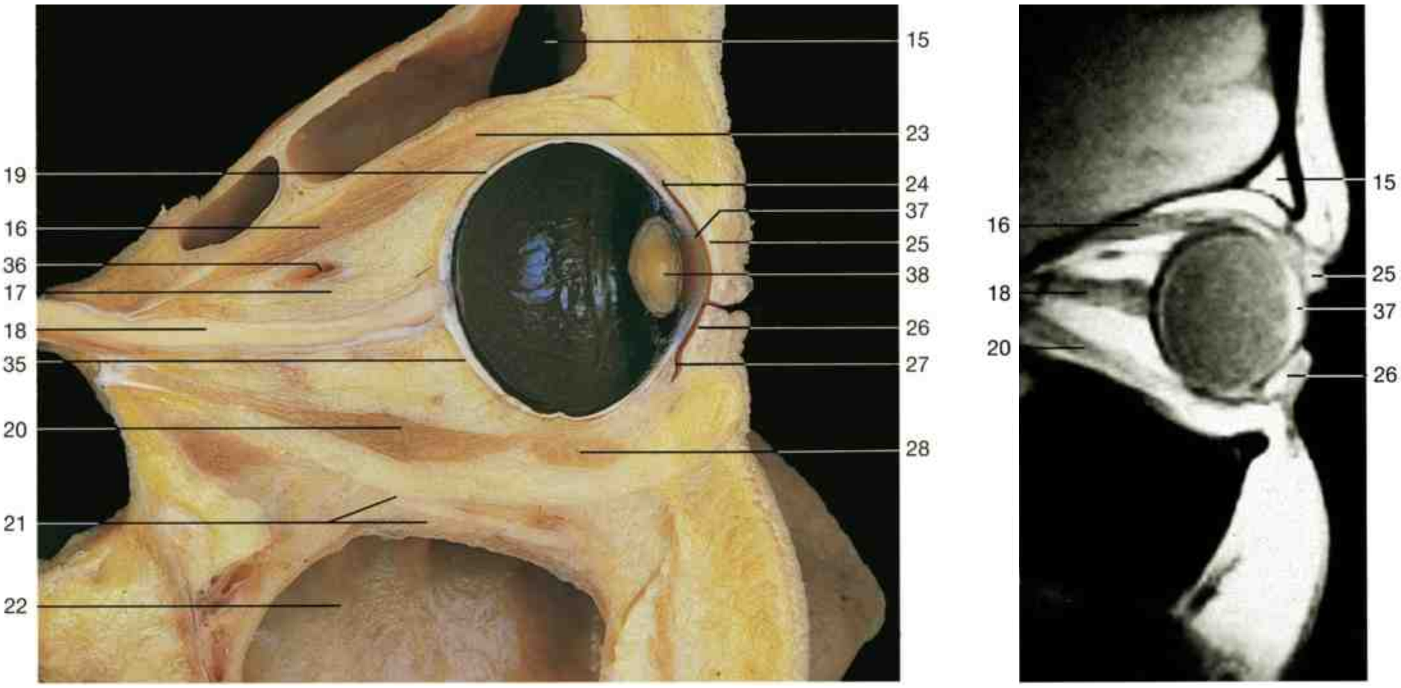


Bones of the left orbit (indicated by different colors).

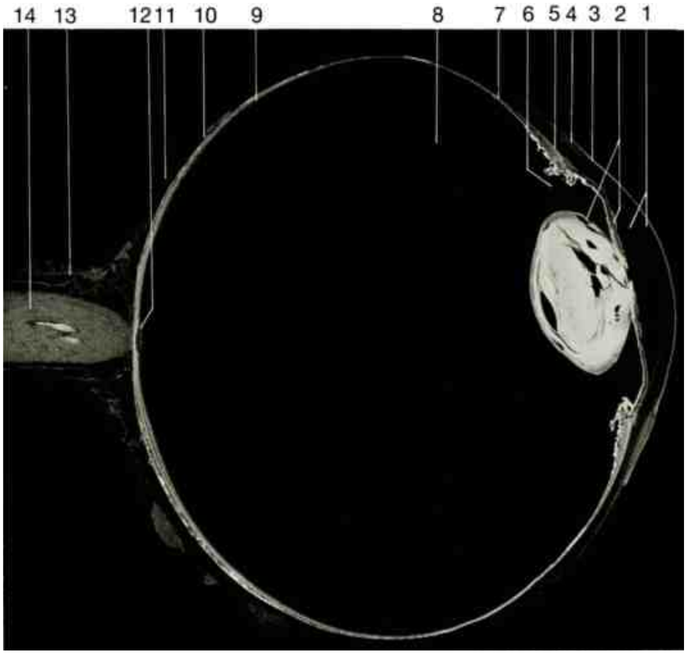
1 Frontal bone
2 Nasal bone
3 Lacrimal bone
4 Maxilla (frontal process)
5 Ethmoidal foramina
6 Lesser wing of sphenoid bone and optic canal
7 Superior orbital fissure
8 Greater wing of sphenoid bone
9 Orbital process of palatine bone
10 Orbital plate of ethmoid bone
11 Inferior orbital fissure
12 Infra-orbital sulcus
13 Nasolacrimal canal
14 Zygomatic bone
15 Frontal sinus
16 Superior rectus muscle
17 Orbital fatty tissue
18 Optic nerve
19 Sclera
20 Inferior rectus muscle
21 Periorbita and maxilla
22 Maxillary sinus
23 Levator palpebrae superioris muscle
24 Superior conjunctival fornix
25 Superior tarsal plate
26 Inferior tarsal plate
27 Inferior conjunctival fornix
28 Inferior oblique muscle
29 Lateral rectus muscle
30 Medial rectus muscle
31 Superior oblique muscle
32 Nasal septum
33 Middle nasal concha
34 Inferior nasal concha
35 Tenon’s space
36 Ophthalmic artery
37 Cornea
38 Lens



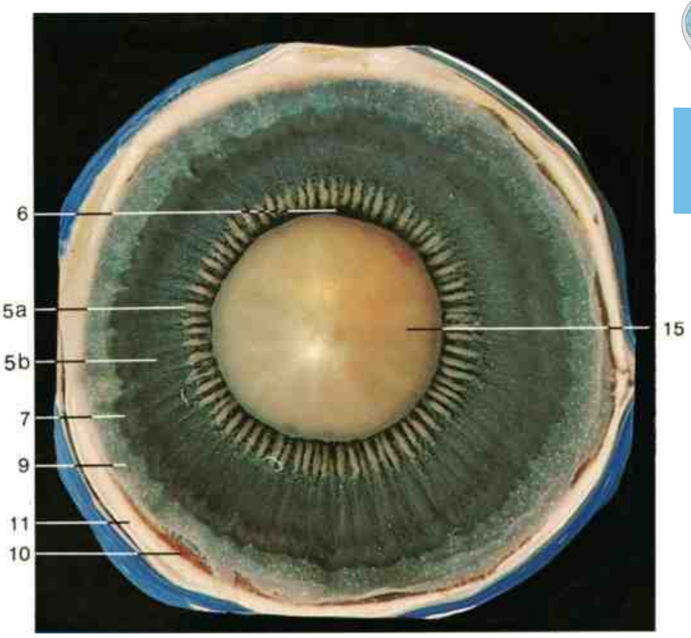
Frontal section through the posterior part of the orbit.



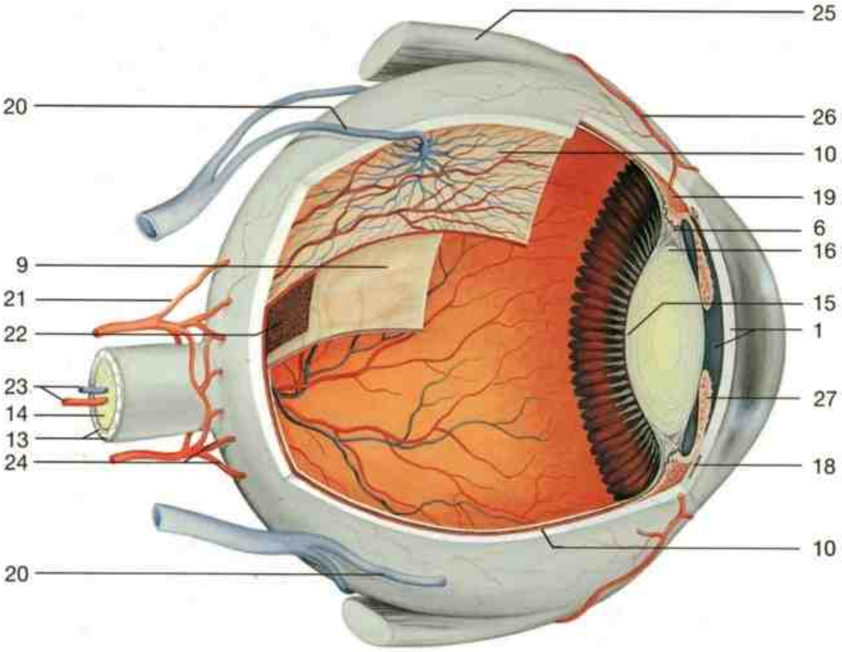
Sagittal section through orbit and eyeball. (Right: MRI scan.)



Horizontal section through the human eye (2×).



Anterior segment of the eyeball (posterior aspect). The opacity of the lens is an artifact.



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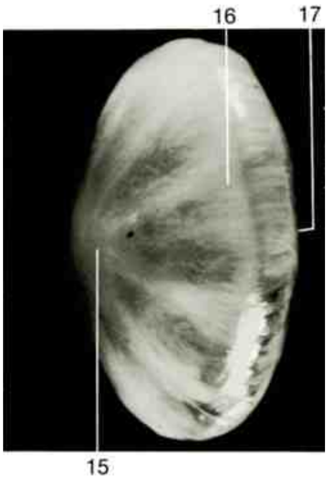
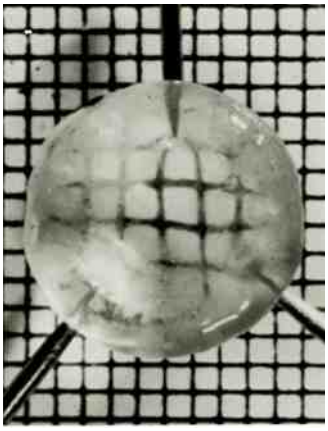
Organization of the eyeball. Demonstration of vascular tunic of bulb (schematic drawing).

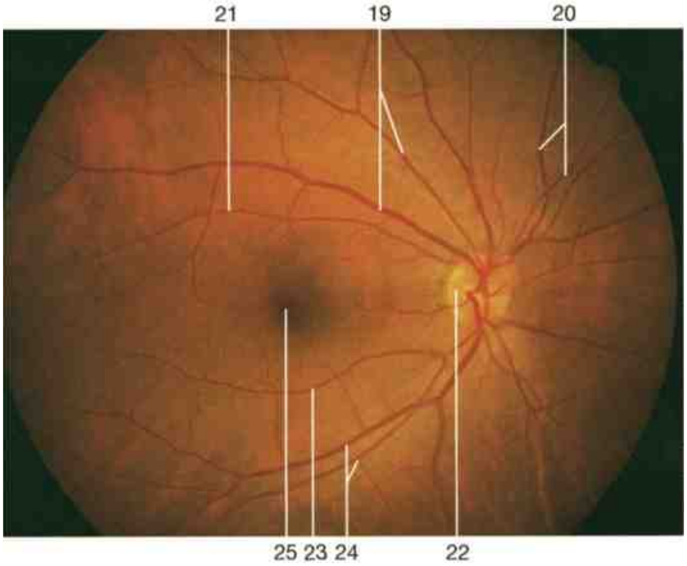


Lens (equatorial aspect), anterior pole to the right.

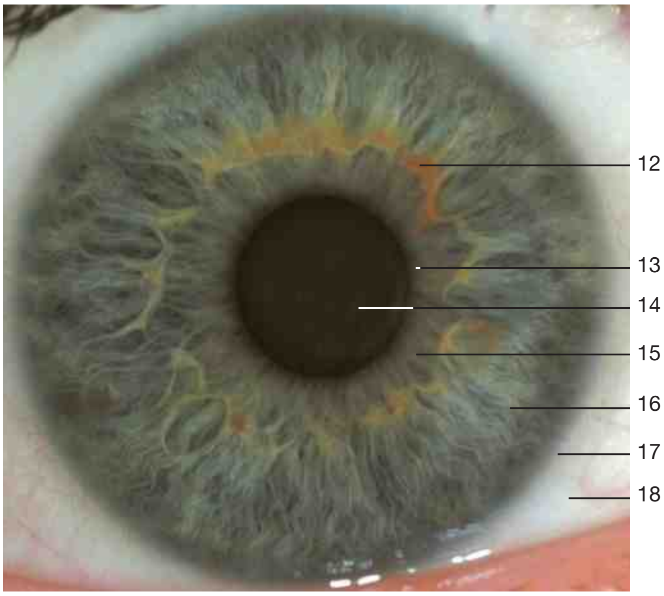


Lens (frontal aspect). Note the magnification effect.

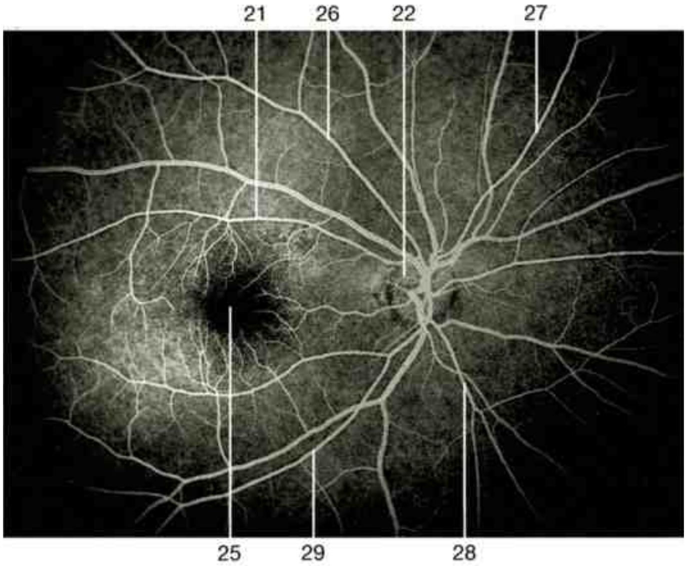
1 Cornea and anterior chamber
2 Iris and lens
3 Transitional zone between corneal and conjunctival epithelium
4 Conjunctiva of the eyeball
5 Ciliary body
  a Ciliary processes (pars plicata)
  b Ciliary ring (pars plana)
6 Zonular fibers
7 Ora serrata
8 Vitreous body
9 Retina
10 Choroid
11 Sclera
12 Optic disc
13 Dura mater and subarachnoid space
14 Optic nerve (n. II)
15 Lens (posterior pole)
16 Equator of lens
17 Lens (anterior pole)
18 Canal of Schlemm
19 Ciliary muscle
20 Vena vorticosa
21 Long posterior ciliary artery
22 Retinal pigmented epithelium
23 Central retinal artery and vein
24 Short posterior ciliary arteries
25 External ocular muscle
26 Anterior ciliary artery
27 Iris



Fundus of a normal right eye (courtesy of Prof. Okamura, Univ. Eye Dept., Kumamoto, Japan). Notice, the arteries are smaller and lighter than the veins.



Anterior segment of the human eye (courtesy of Prof. Naumann, Eye Dept., University of Erlangen, Germany). Note the colored iris (16) and the location of the lens behind the iris (14).



Fluorescent angiography of the right eye; retinal vessels. The same eye as above (courtesy of Prof. Okamura, Univ. Eye Dept., Kumamoto, Japan).

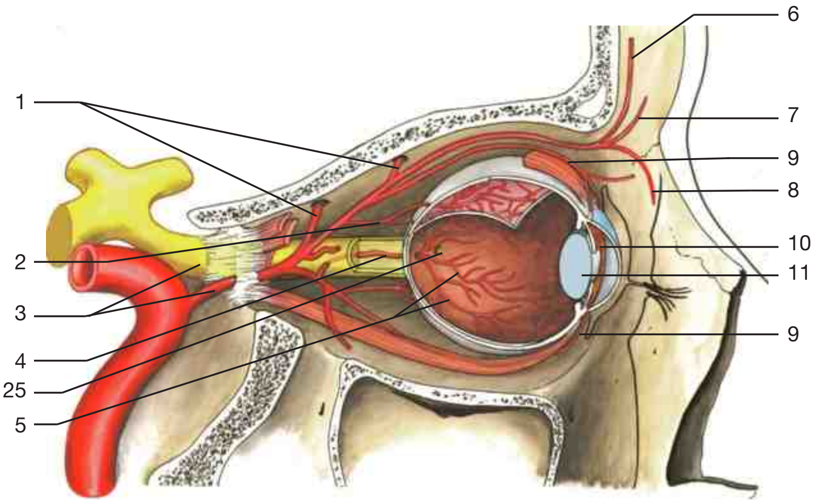
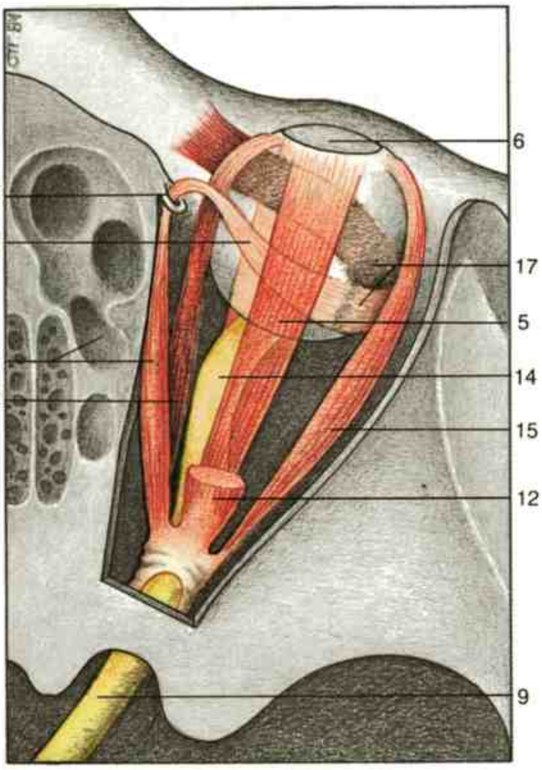
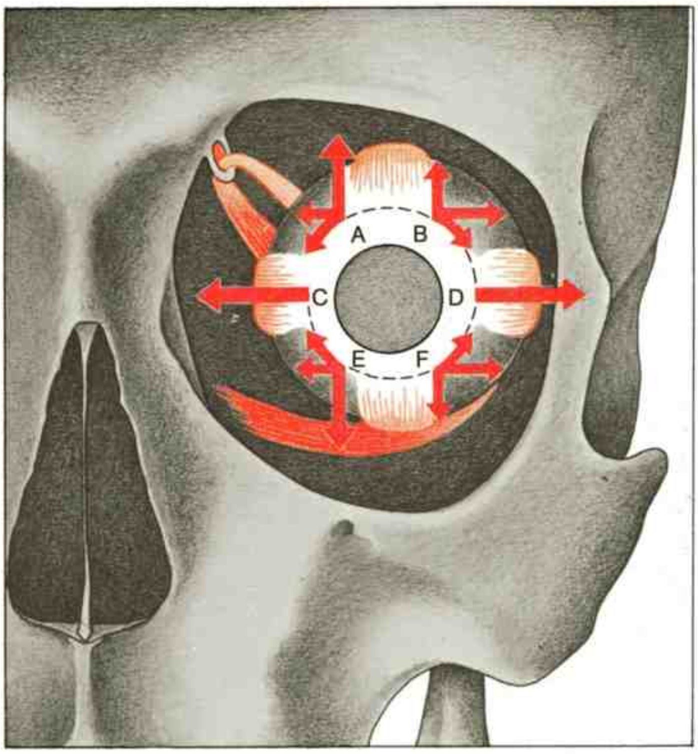


Diagram of the ophthalmic artery and its branches.

1 Posterior and anterior ethmoidal arteries
2 Long and short posterior ciliary arteries
3 Optic nerve and ophthalmic artery
4 Central retinal artery
5 Retinal arteries
6 Supratrochlear artery
7 Supra-orbital artery
8 Dorsal nasal artery
9 Anterior ciliary artery
10 Iridial arteries
11 Lens
12 Iridial fold
13 Pupillary margin of iris
14 Anterior pole of lens
15 Lesser circle of iris
16 Greater circle of iris
17 Margin of cornea or limbus
18 Sclera
19 Superior temporal artery and vein of retina
20 Superior nasal artery and vein of retina
21 Superior macular artery
22 Optic disc
23 Inferior macular artery
24 Inferior temporal artery and vein
25 Fovea centralis and macula lutea
26 Superior temporal artery
27 Superior nasal artery
28 Inferior nasal artery
29 Inferior temporal artery
} of retina

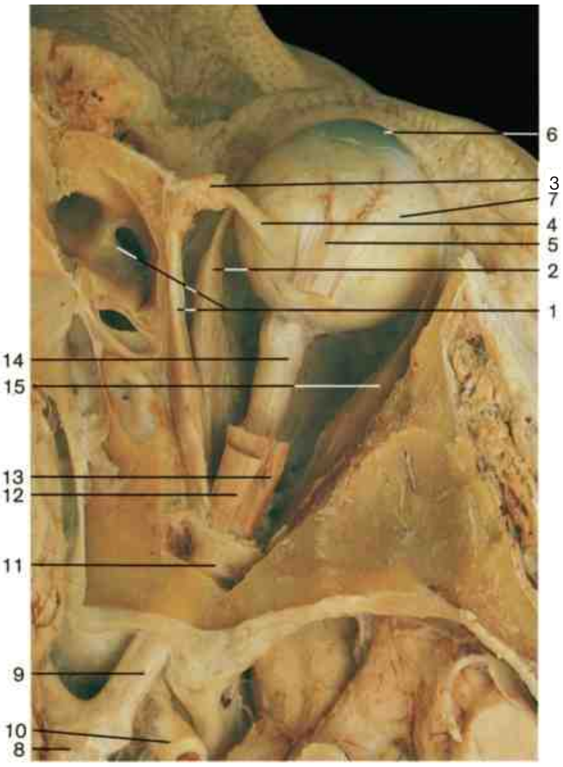


Schematic diagram of the extra-ocular muscles. Right orbit (from above). Levator palpebrae superioris muscle has been severed.

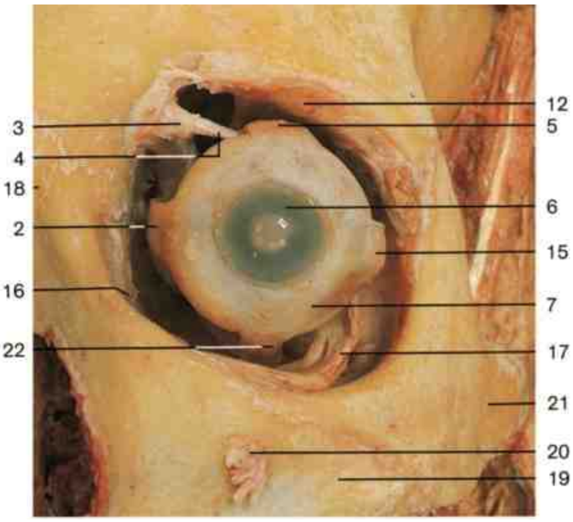


The action of the extra-ocular muscles. Left orbit (anterior aspect).

A = Superior rectus muscle
B = Inferior oblique muscle
C = Medial rectus muscle
D = Lateral rectus muscle
E = Inferior rectus muscle
F = Superior oblique muscle

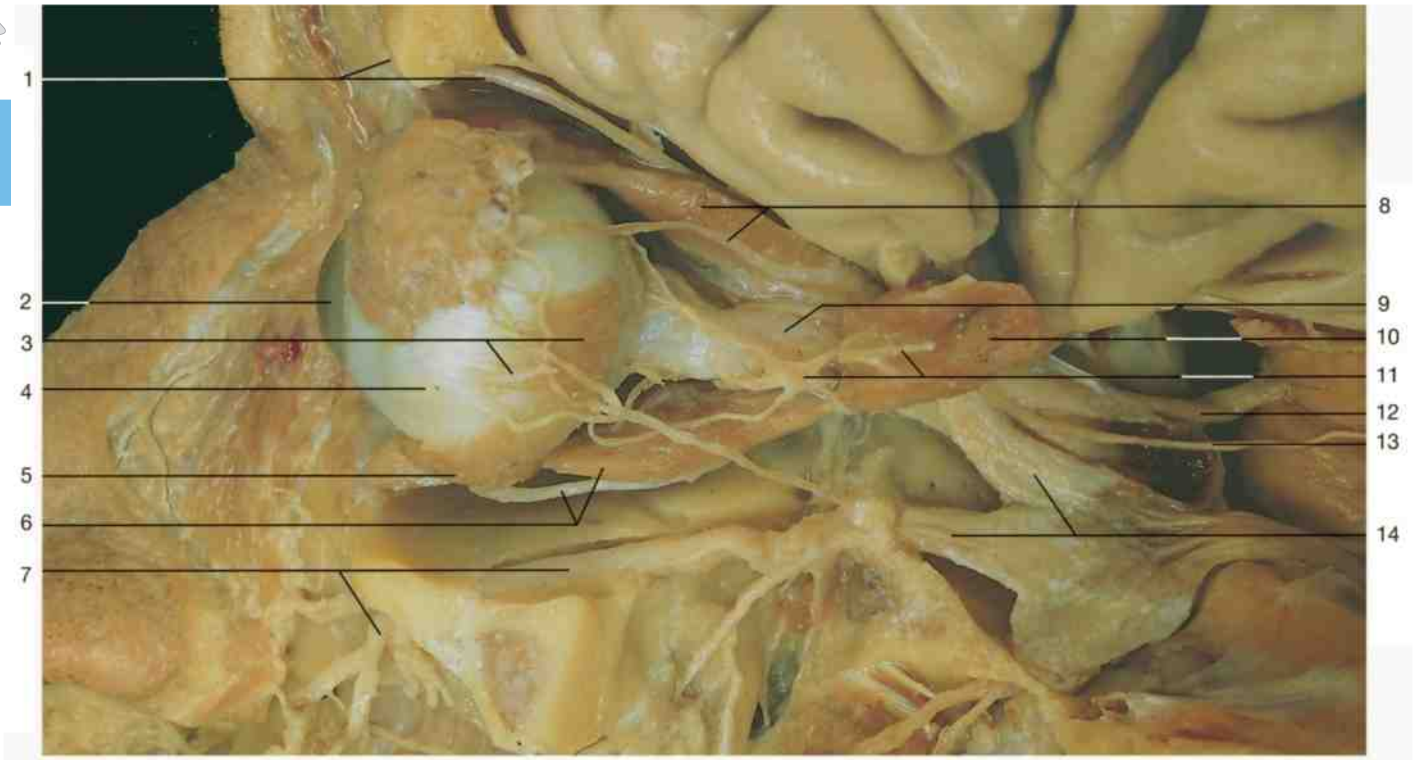


Right orbit with eyeball and extra-ocular muscles (from above). The roof of the orbit has been removed, the superior rectus muscle and the levator palpebrae superioris muscle have been severed.

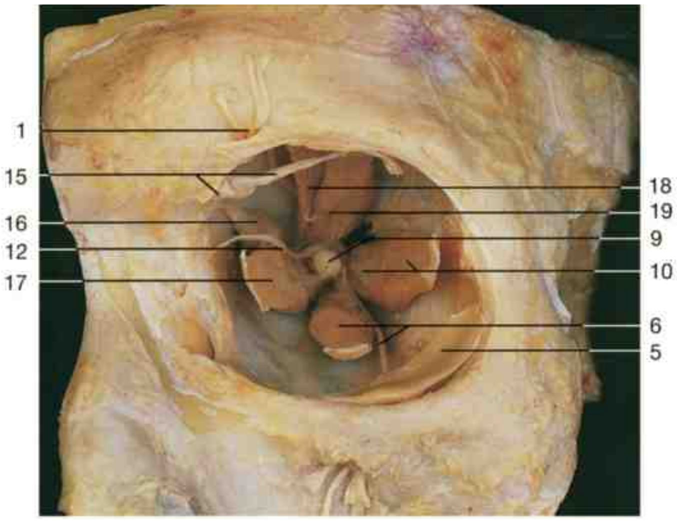


Left orbit with eyeball and extra-ocular muscles (anterior aspect). Lids, conjunctiva, and lacrimal apparatus have been removed.

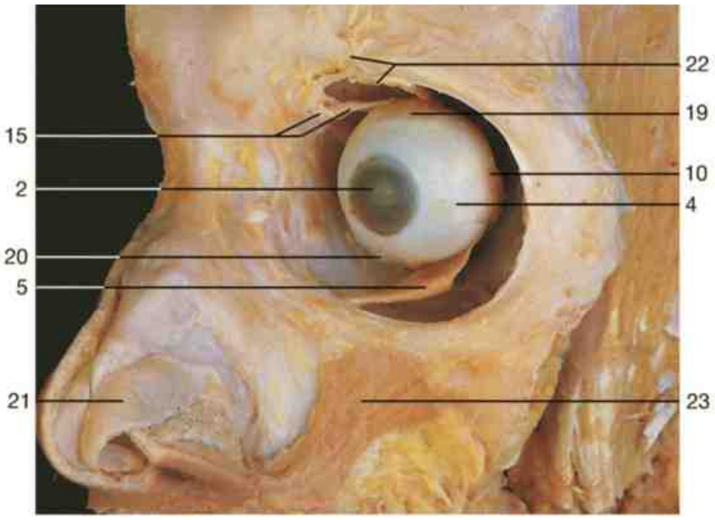
1 Superior oblique muscle and ethmoid air cells
2 Medial rectus muscle
3 Trochlea
4 Tendon of superior oblique muscle
5 Superior rectus muscle
6 Cornea
7 Eyeball
8 Optic chiasma
9 Optic nerve (intracranial part)
10 Internal carotid artery
11 Common annular tendon
12 Levator palpebrae superioris muscle
13 Superior rectus muscle
14 Optic nerve (extracranial part)
15 Lateral rectus muscle
16 Nasolacrimal duct
17 Inferior oblique muscle
18 Nasal bone
19 Maxilla
20 Infra-orbital foramen and nerves
21 Zygomatic bone
22 Inferior rectus muscle



Extra-ocular muscles and their nerves (lateral aspect of left eye). Lateral rectus divided and reflected.

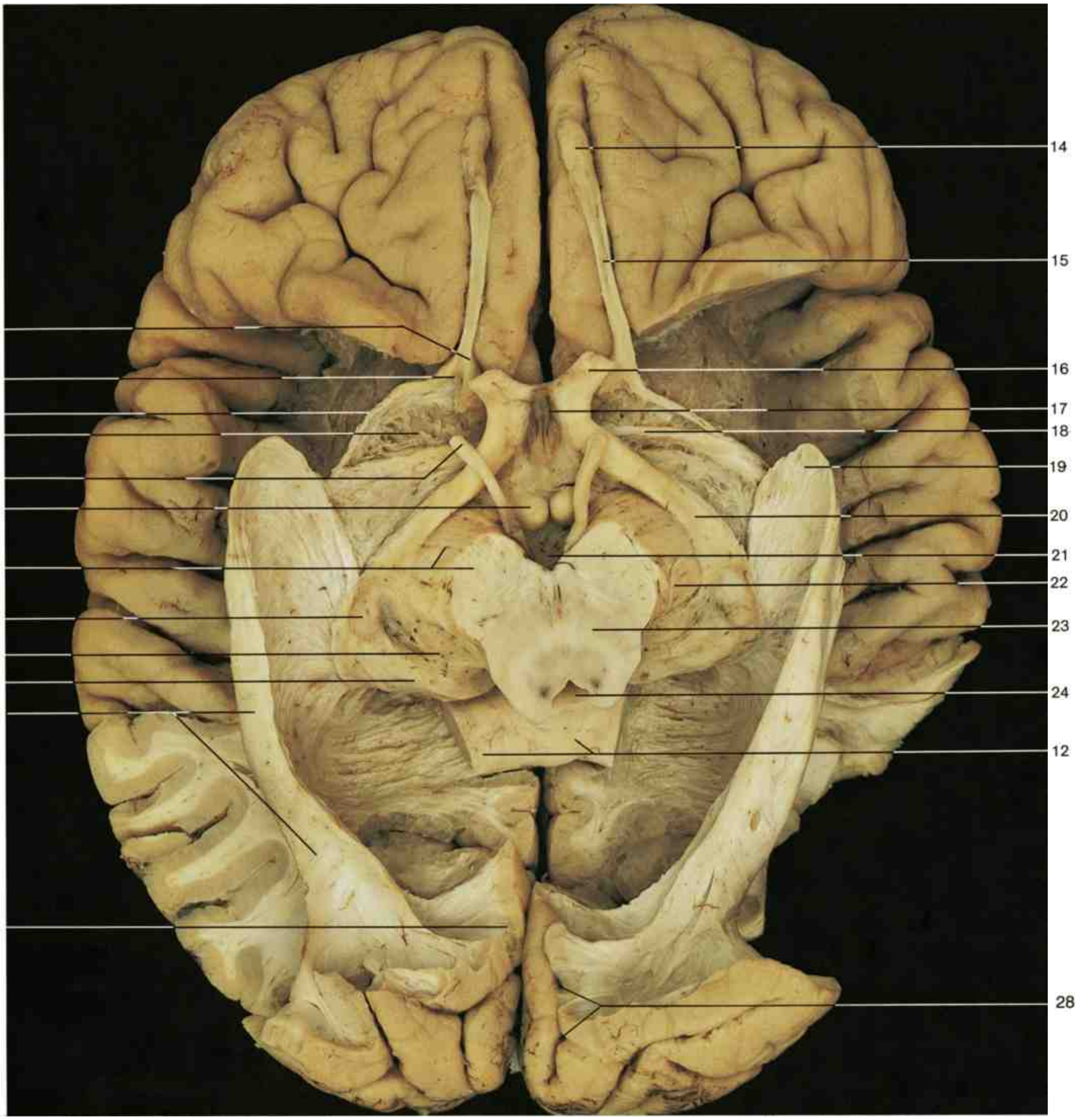


Left orbit with extra-ocular muscles (anterior aspect). Eyeball removed.



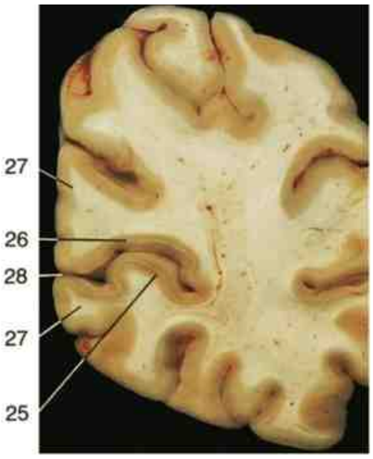
Extra-ocular eye muscles (antero-lateral aspect).

1 Supra-orbital nerve
2 Cornea
3 Insertion of lateral rectus muscle
4 Eyeball (sclera)
5 Inferior oblique muscle
6 Inferior rectus muscle and inferior branch of oculomotor nerve
7 Infra-orbital nerve
8 Superior rectus muscle and lacrimal nerve
9 Optic nerve
10 Lateral rectus muscle
11 Ciliary ganglion and abducens nerve (n. VI)
12 Oculomotor nerve (n. III)
13 Trochlear nerve (n. IV)
14 Ophthalmic nerve (n. V_1) and maxillary nerve (n. V_2)
15 Trochlea and tendon of superior oblique muscle
16 Superior oblique muscle
17 Medial rectus muscle
18 Levator palpebrae superioris muscle
19 Superior rectus muscle
20 Inferior rectus muscle
21 Greater alar cartilage
22 Supra-orbital nerve and levator palpebrae superioris muscle
23 Levator labii superioris muscle

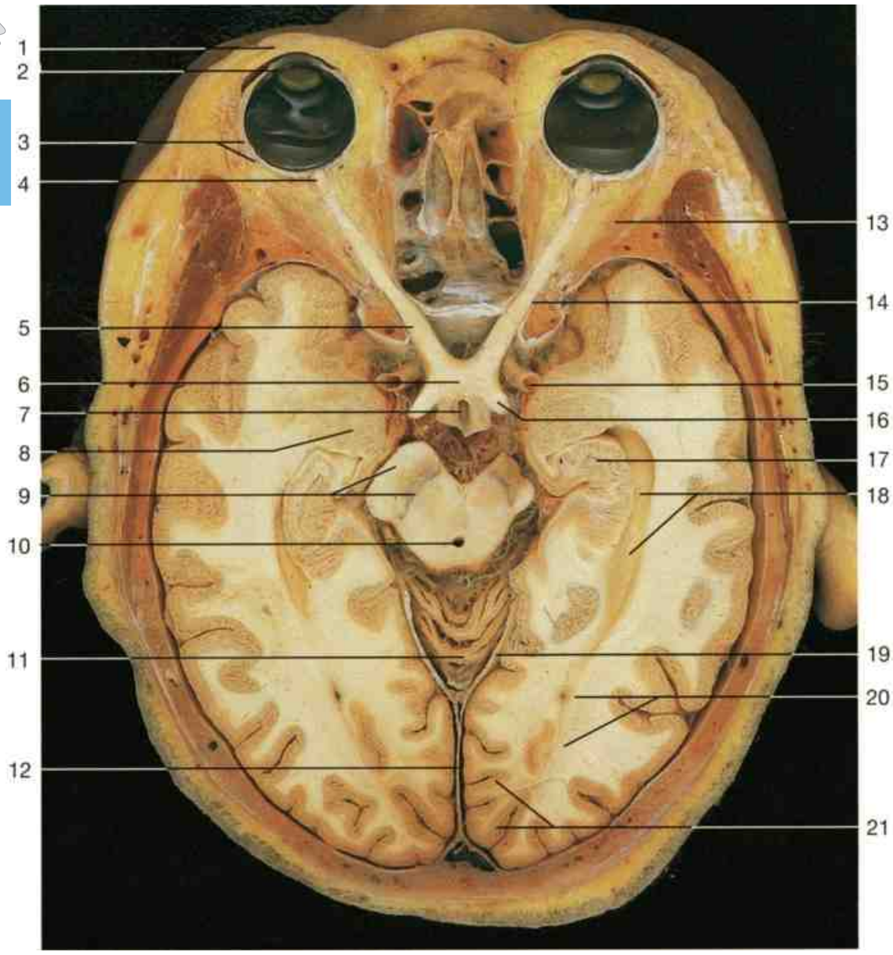


Dissection of the visual pathway (inferior aspect). Frontal pole at top, midbrain divided.

1	Medial olfactory stria	15	Olfactory tract
2	Olfactory trigone	16	Optic nerve (n. II)
3	Lateral olfactory stria	17	Infundibulum
4	Anterior perforated substance	18	Anterior commissure
5	Oculomotor nerve (n. III)	19	Genu of optic radiation
6	Mamillary body	20	Optic tract
7	Cerebral peduncle	21	Interpeduncular fossa and posterior perforated substance
8	Lateral geniculate body	22	Trochlear nerve (n. IV)
9	Medial geniculate body	23	Substantia nigra
10	Pulvinar of thalamus	24	Cerebral aqueduct
11	Optic radiation	25	Visual cortex
12	Splenium of the corpus callosum (commissural fibers)	26	Line of Gennari
13	Cuneus	27	Gyrus of striate cortex
14	Olfactory bulb	28	Calcarine sulcus

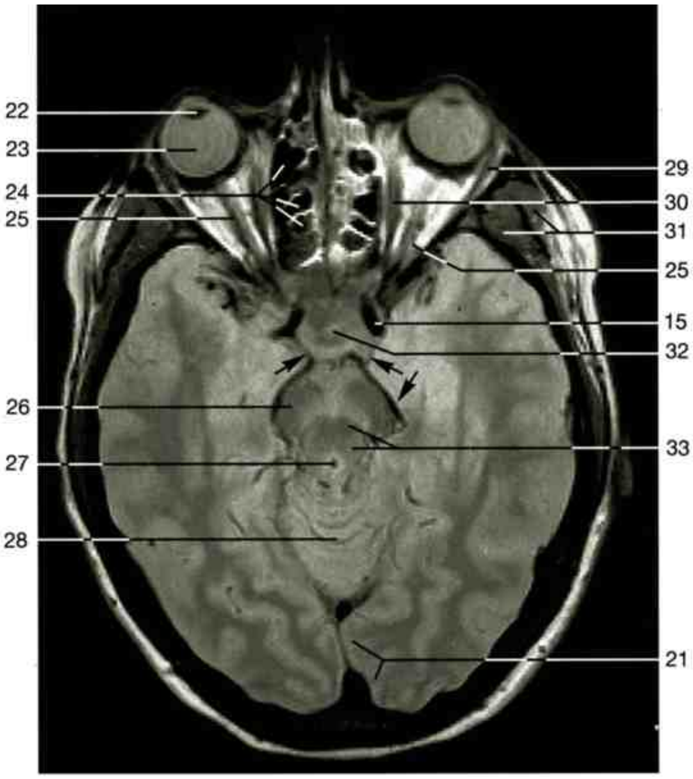


Frontal section of the striate cortex at the level of the striate area in the occipital lobe.



1 Upper lid
2 Cornea
3 Eyeball (sclera, retina)
4 Head of optic nerve
5 Optic nerve
6 Optic chiasma
7 Infundibular recess of hypothalamus
8 Amygdaloid body
9 Substantia nigra and crus cerebri
10 Cerebral aqueduct
11 Vermis of cerebellum
12 Falx cerebri
13 Lateral rectus muscle
14 Optic canal
15 Internal carotid artery
16 Optic tract
17 Hippocampus
18 Inferior horn of lateral ventricle
19 Tentorium cerebelli
20 Optic radiation of Gratiolet
21 Visual cortex (area calcarina, striate cortex)
22 Lens
23 Eyeball
24 Ethmoidal cells
25 Optic nerve with dura sheath
26 Cerebral peduncle
27 Aqueduct of mesencephalon
28 Vermis of cerebellum

Horizontal section through the head at the level of optic chiasma and striate cortex (superior aspect). Note the relationship of hypothalamic infundibulum to optic chiasma.



Horizontal section through the human head (MRI scan, courtesy of Prof. W. J. Huk, Erlangen, Germany). Arrows = branches of arterial circle of Willis.

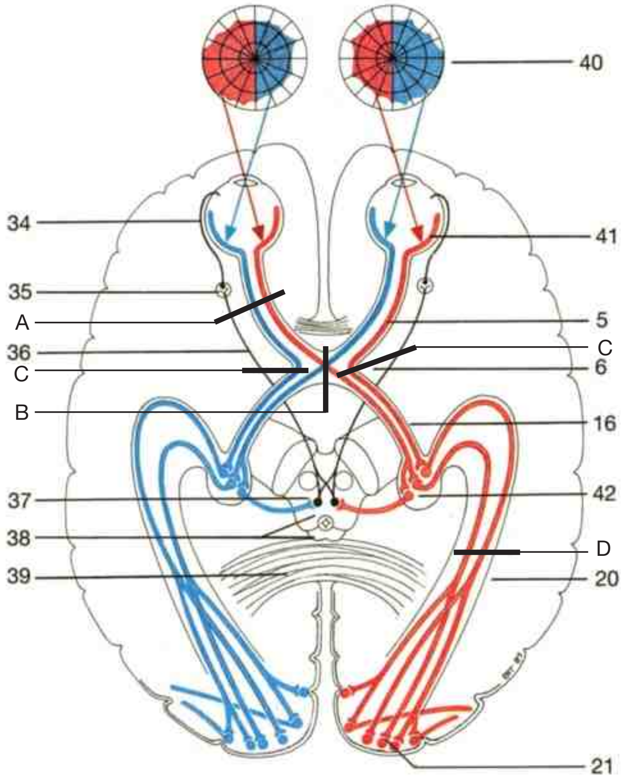
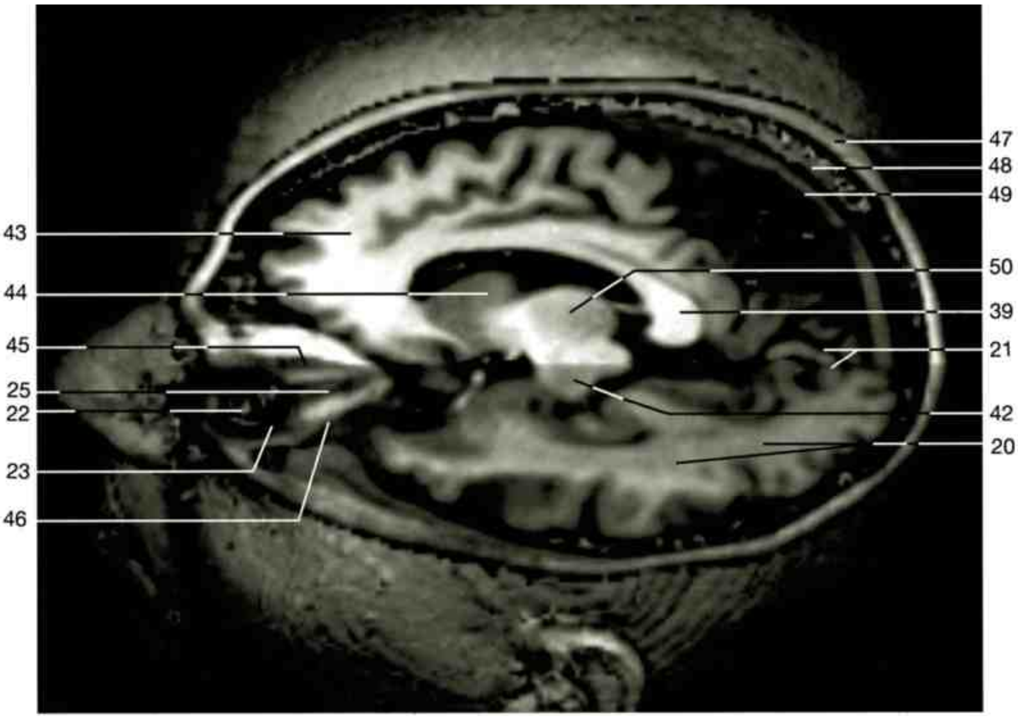
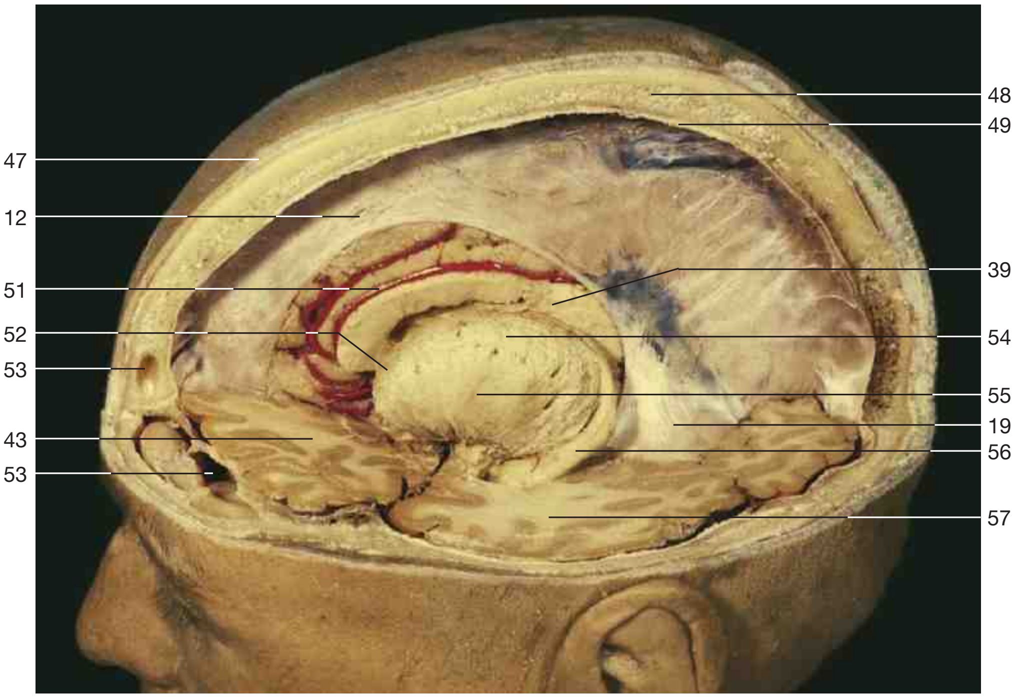


Diagram of the visual pathway and path of the light reflex.



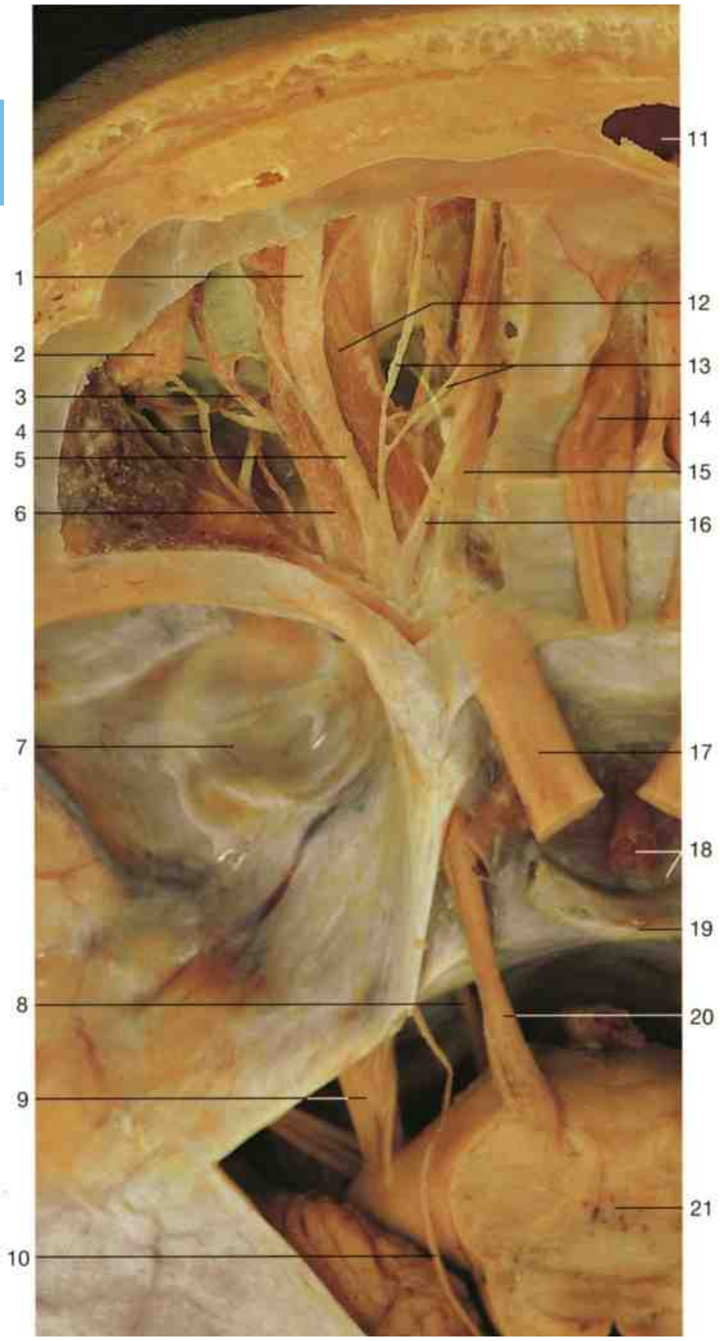
3-D reconstruction of the human visual system (MRI scan flash 40°, courtesy of Prof. Huk, University of Erlangen, Germany).



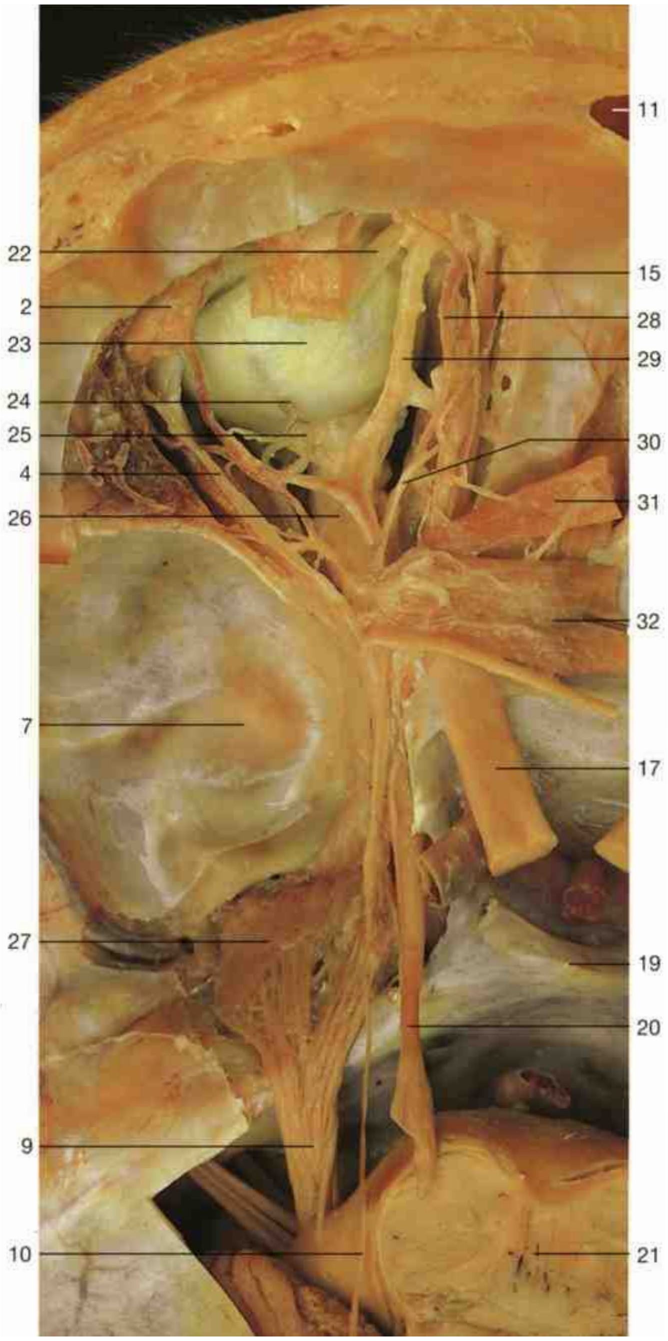
Dissection of brain stem in situ. Left hemisphere has been partly removed (compare with MRI scan above).

29	Lateral rectus muscle
30	Medial rectus muscle
31	Temporalis muscle
32	Hypophysis (pituitary gland)
33	Midbrain
34	Ciliary nerves (long and short)
35	Ciliary ganglion
36	Oculomotor nerve
37	Accessory oculomotor nucleus
38	Colliculi of midbrain
39	Corpus callosum
40	Visual field
41	Retina
42	Lateral geniculate body
43	Frontal lobe
44	Caudate nucleus
45	Medial rectus muscle
46	Lateral rectus muscle
47	Skin
48	Diploe (skull)
49	Dura mater
50	Thalamus
51	Anterior cerebral artery
52	Caudate nucleus
53	Frontal sinus
54	Internal capsule
55	Lentiform nucleus (putamen)
56	Hippocampus
57	Temporal lobe of left hemisphere

In **binocular vision** the visual field (40) is projected upon portions of both retinae (blue and red in the drawing). In the chiasma the fibers from the two retinal portions are combined to form the left optic tract. The fibers of the two eyes remain separated from each other throughout the entire visual pathway up to their final termination in the calcarine cortex (21). **Injuries on the optic pathway** produce visual defects whose nature depends on the location of the injury. Destruction of one optic nerve (A) produces **blindness in the corresponding eye** with loss of pupillary light reflex. If **lesions of the chiasma** destroy the crossing fibers of the nasal portions of the retina (B), both temporal fields of vision are lost **(bitemporal hemianopsia)**. If both lateral angles of the chiasma are compressed (C), the nondecussating fibers from the temporal retinae are affected, resulting in loss of nasal visual fields **(binasal hemianopsia)**. Lesions posterior to the chiasma (D) (i.e., optic tract, lateral geniculate body, optic radiation, or visual cortex) result in a loss of the entire opposite field of vision **(homonymous hemianopsia)**.

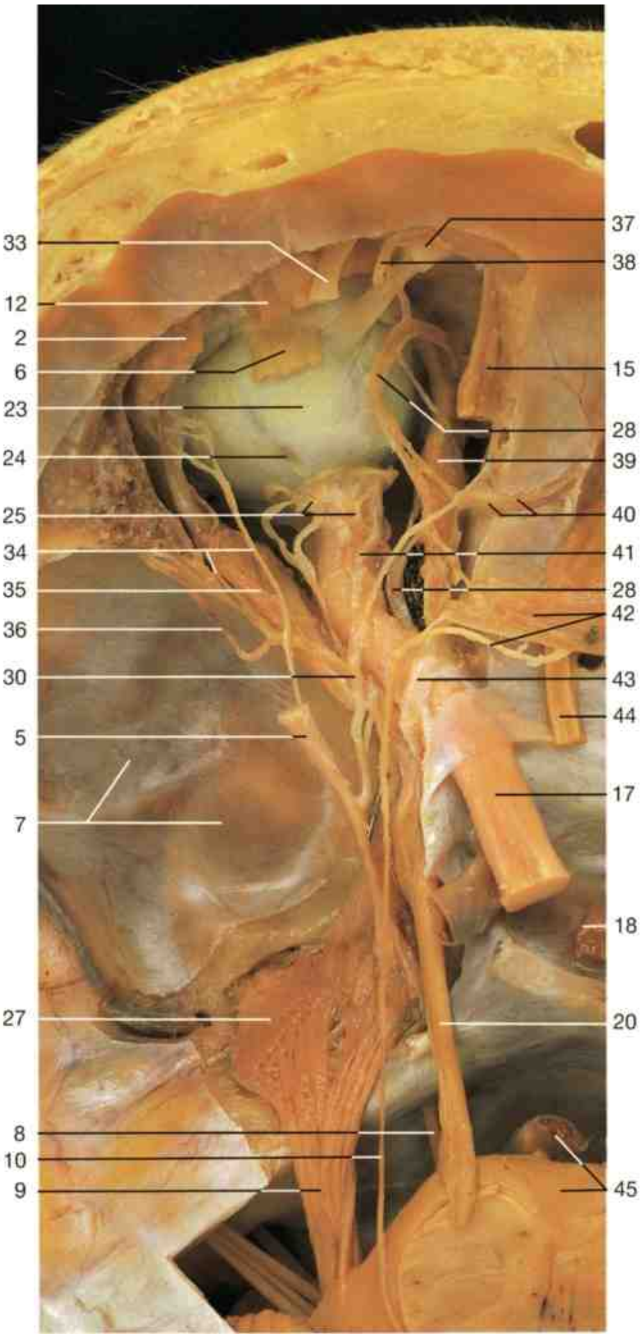


Superficial layer of the left orbit (superior aspect). The roof of the orbit and a portion of the left tentorium have been removed.



Middle layer of the left orbit (superior aspect). The roof of the orbit has been removed and the superior extra-ocular muscles have been divided and reflected.

1	Lateral branch of frontal nerve
2	Lacrimal gland
3	Lacrimal vein
4	Lacrimal nerve
5	Frontal nerve
6	Superior rectus
7	Middle cranial fossa
8	Abducent nerve (n. VI)
9	Trigeminal nerve (n. V)
10	Trochlear nerve (intracranial part) (n. IV)
11	Frontal sinus
12	Levator palpebrae superioris muscle
13	Branches of supratrochlear nerve
14	Olfactory bulb
15	Superior oblique muscle
16	Trochlear nerve (intra-orbital part) (n. IV)
17	Optic nerve (intracranial part)
18	Pituitary gland and infundibulum
19	Dorsum sellae
20	Oculomotor nerve (n. III)
21	Midbrain
22	Tendon of superior oblique muscle
23	Eyeball
24	Vena vorticosa
25	Short ciliary nerves
26	Optic nerve (extracranial part)
27	Trigeminal ganglion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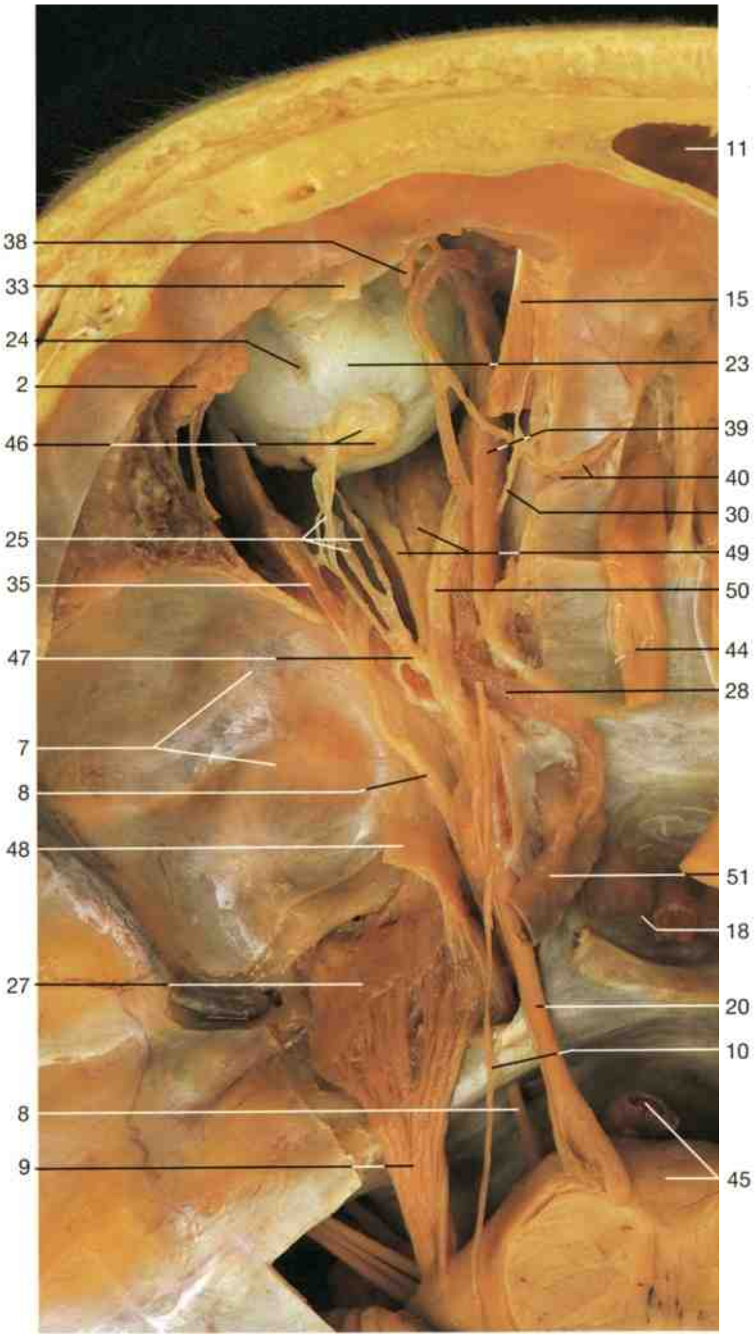
Middle layer of the left orbit (superior aspect). The roof of the orbit and the superior extra-ocular muscles have been removed.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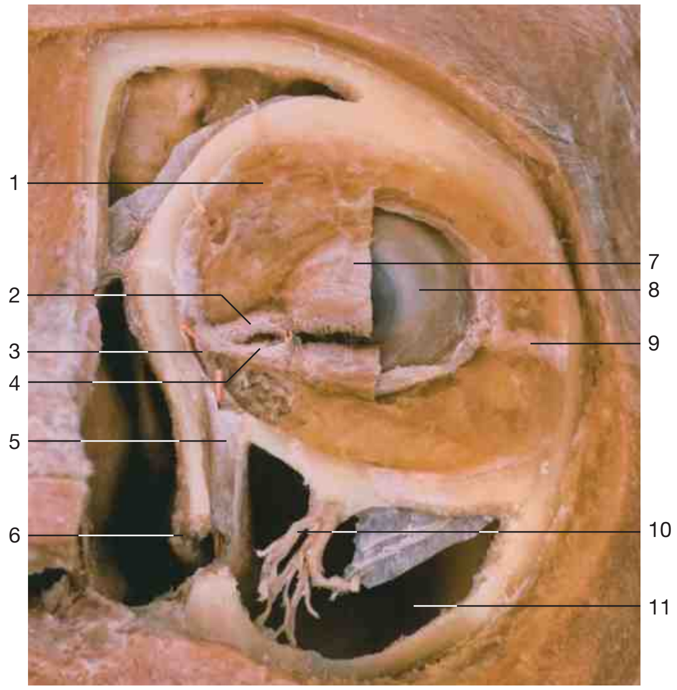
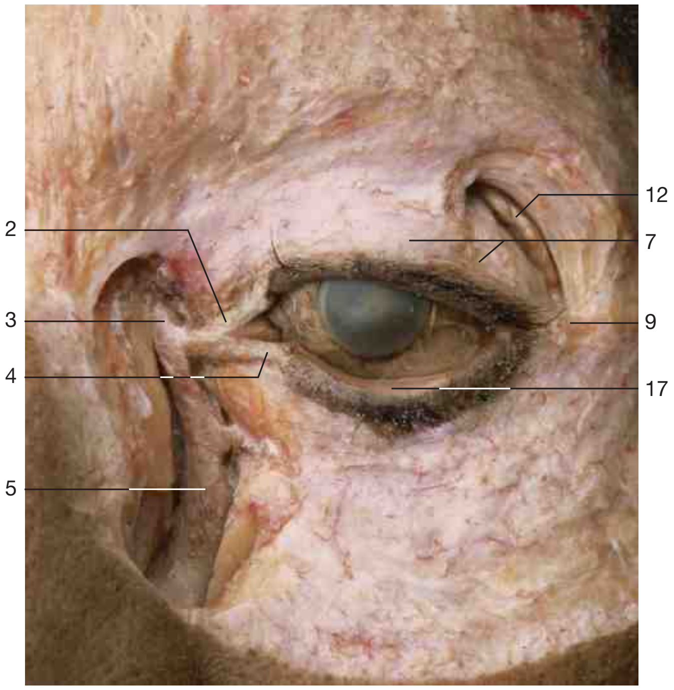
Deeper layer of the left orbit (superior aspect). The optic nerve has now been removed.

28 Ophthalmic artery
29 Superior ophthalmic vein
30 Nasociliary nerve
31 Levator palpebrae superioris muscle (reflected)
32 Superior rectus muscle (reflected)
33 Lateral branch of supra-orbital nerve
34 Lacrimal nerve and artery
35 Lateral rectus muscle
36 Meningolacrimal artery (anastomosing with middle meningeal artery)
37 Trochlea
38 Medial branch of supra-orbital nerve
39 Medial rectus muscle
40 Anterior ethmoidal artery and nerve
41 Long ciliary nerve
42 Superior oblique muscle and trochlear nerve
43 Common tendinous ring
44 Olfactory tract
45 Basilar artery and pons
46 Optic nerve (external sheath of optic nerve, divided)
47 Ciliary ganglion
48 Ophthalmic nerve (divided, reflected)
49 Inferior branch of oculomotor nerve and inferior rectus muscle
50 Superior branch of oculomotor nerve
51 Internal carotid artery

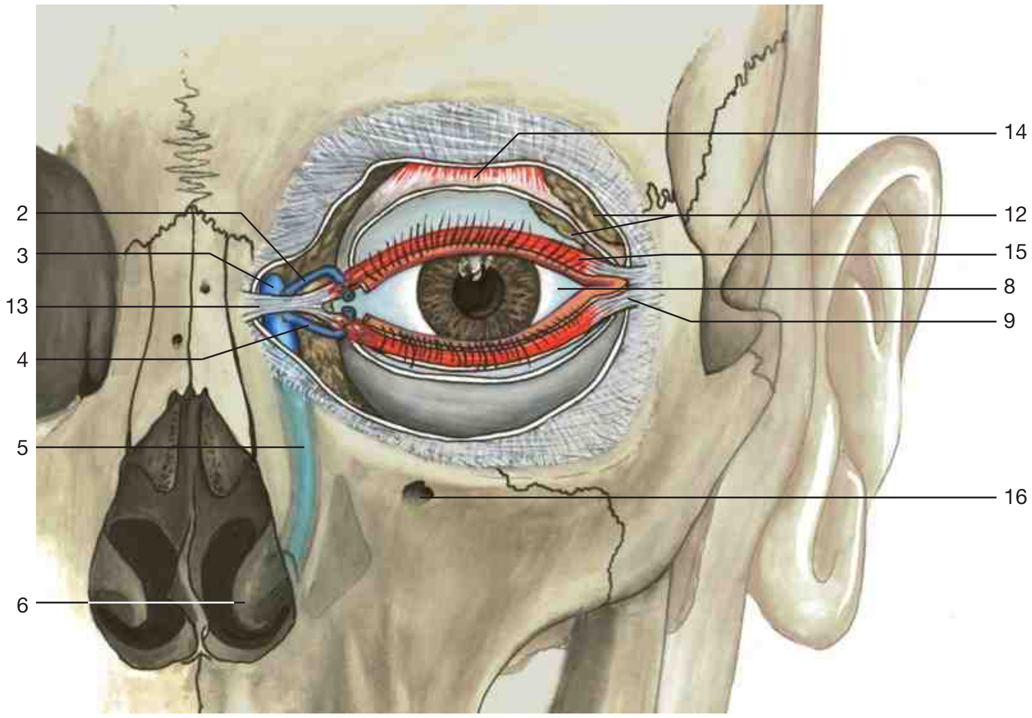


Lids and lacrimal apparatus of the left eye. Parts of the eyelids have been removed to reveal the underlying eyeball. The maxillary sinus has been opened.



Lacrimal apparatus of the left eye.

1 Orbicularis oculi muscle
2 Superior lacrimal canaliculus
3 Lacrimal sac
4 Inferior lacrimal canaliculus
5 Nasolacrimal duct
6 Inferior nasal concha
7 Upper eyelid
8 Eyeball
9 Lateral palpebral ligament
10 Infra-orbital artery and nerve
11 Maxillary sinus
12 Lacrimal gland
13 Medial palpebral ligament
14 Aponeurosis of levator palpebrae superioris muscle
15 Palpebral portion of the orbicularis oculi muscle
16 Infra-orbital foramen
17 Palpebral conjunctiva of lower lid

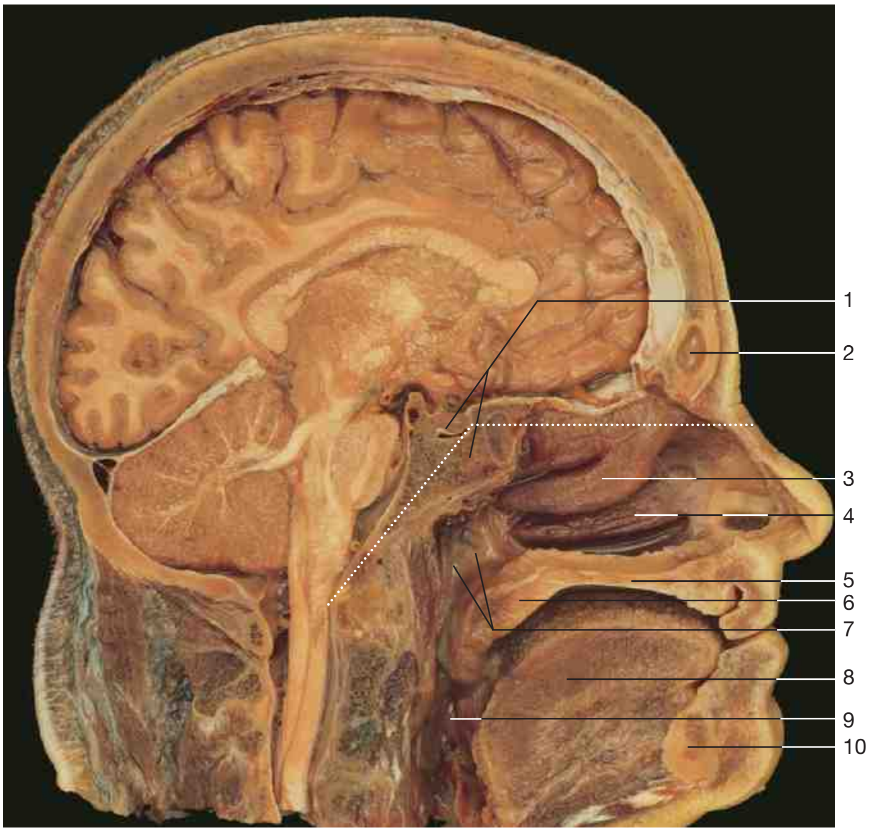


Lacrimal apparatus of the left eye (schematic drawing). Red = Palpebral portion of the orbicularis oculi muscle.

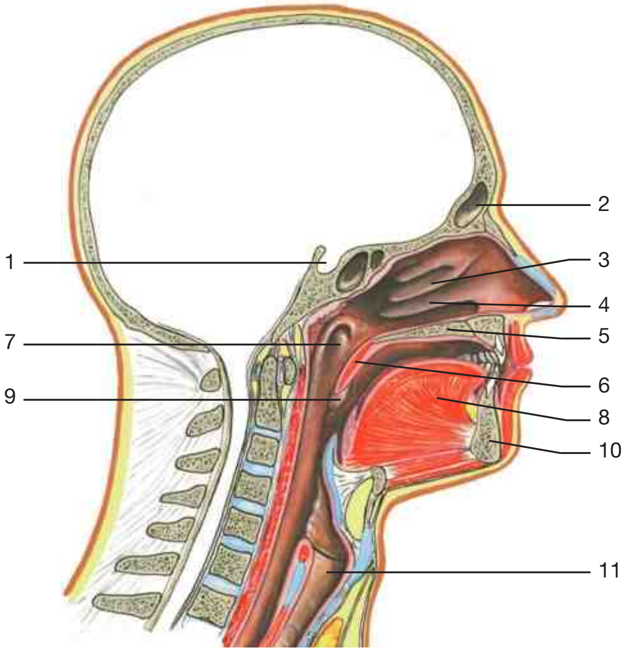
2.4 Oral and Nasal Cavities

During evolution, the oral and nasal cavities of the human head were situated upon each other, so the human face developed in the frontal plane. The **nasal cavities** are separated by the nasal septum. They contain three conchae, where openings to the ethmoidal and maxillary sinus are located. Posteriorly the two nasal cavities open into the nasopharynx through the choanae.

The **oral cavity** is separated from the nasal cavity by the palate. When the mouth is closed, the oral cavity is fully occupied by the tongue, which is characterized by its high mobility, necessary for the development of speech and song. Specific lymphatic organs (tonsils) are located at the entrance of the nasopharynx in both the nasal and oval cavities to protect the digestive tract from infection. The respiratory and digestory tracts cross each other within the nasopharynx, the most important requirement for the development of speech.

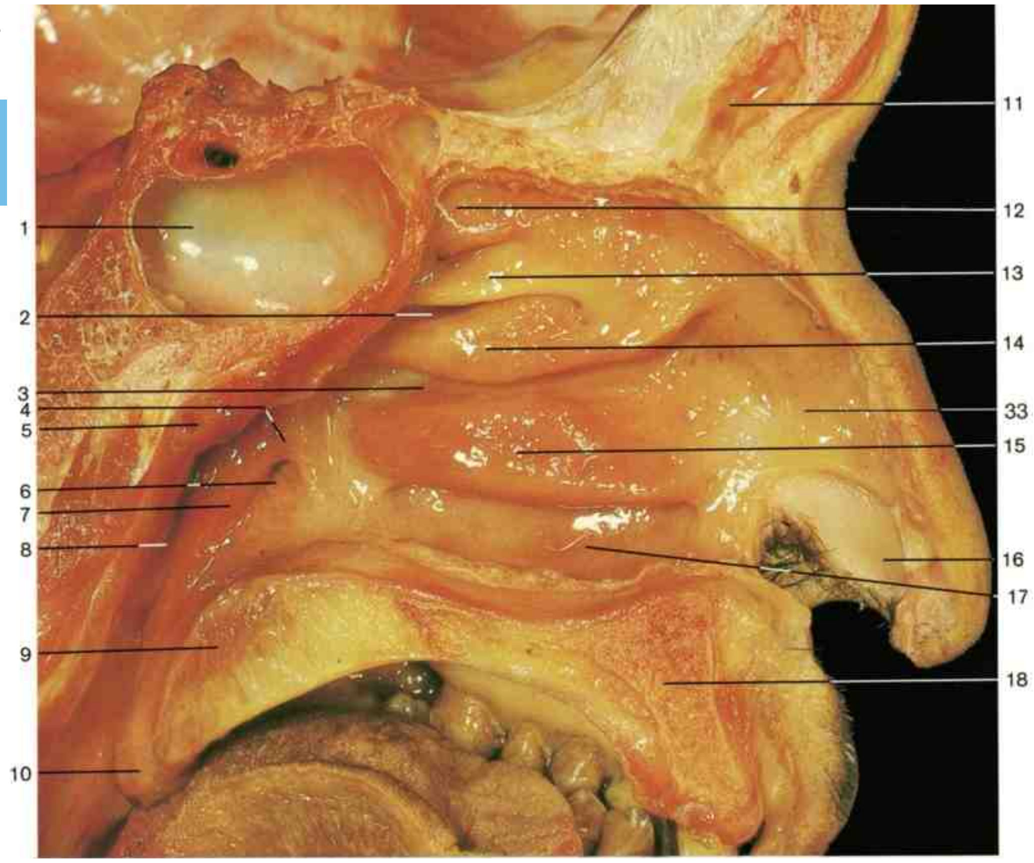


Median sagittal section through the head. The palate separates nasal and oral cavities. The base of the skull forms an angle of about 150° at the sella turcica (dotted line).



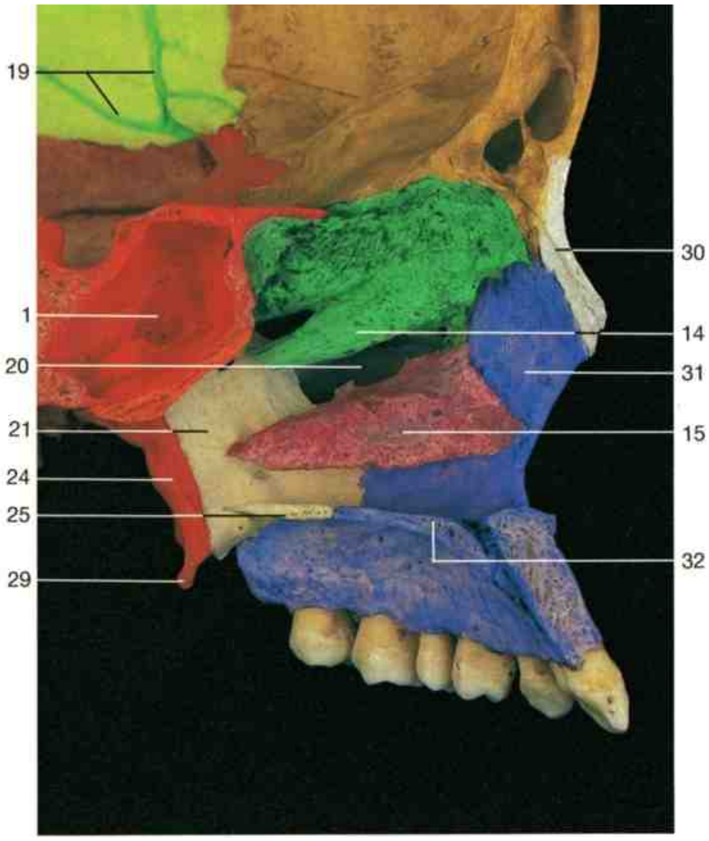
Median sagittal section through the head (schematic drawing). The tongue has been disposed to show the connection of the oral cavity with the pharynx and the position of the palatine tonsil.

1	Hypophysis within hypophysial fossa
2	Frontal sinus
3	Middle nasal concha
4	Inferior nasal concha
5	Hard palate
6	Soft palate
7	Pharynx with auditory tube
8	Tongue
9	Pharynx with palatine tonsil
10	Mandible
11	Larynx

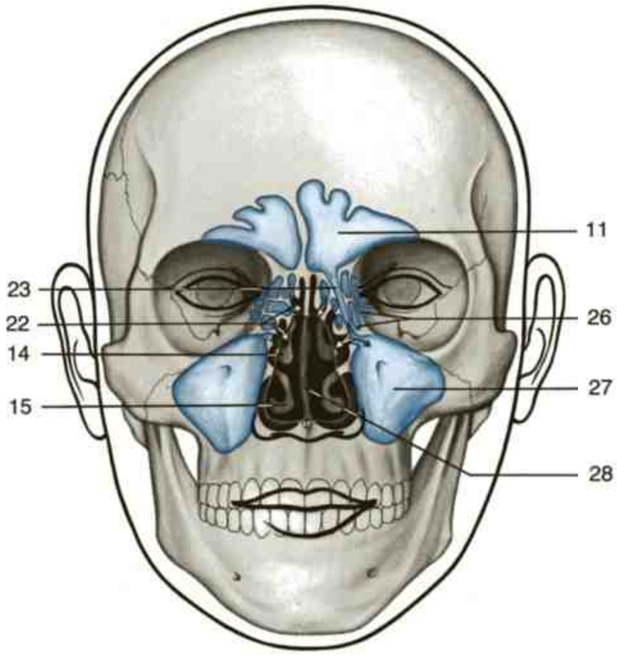


Lateral wall of the nasal cavity. Septum removed.

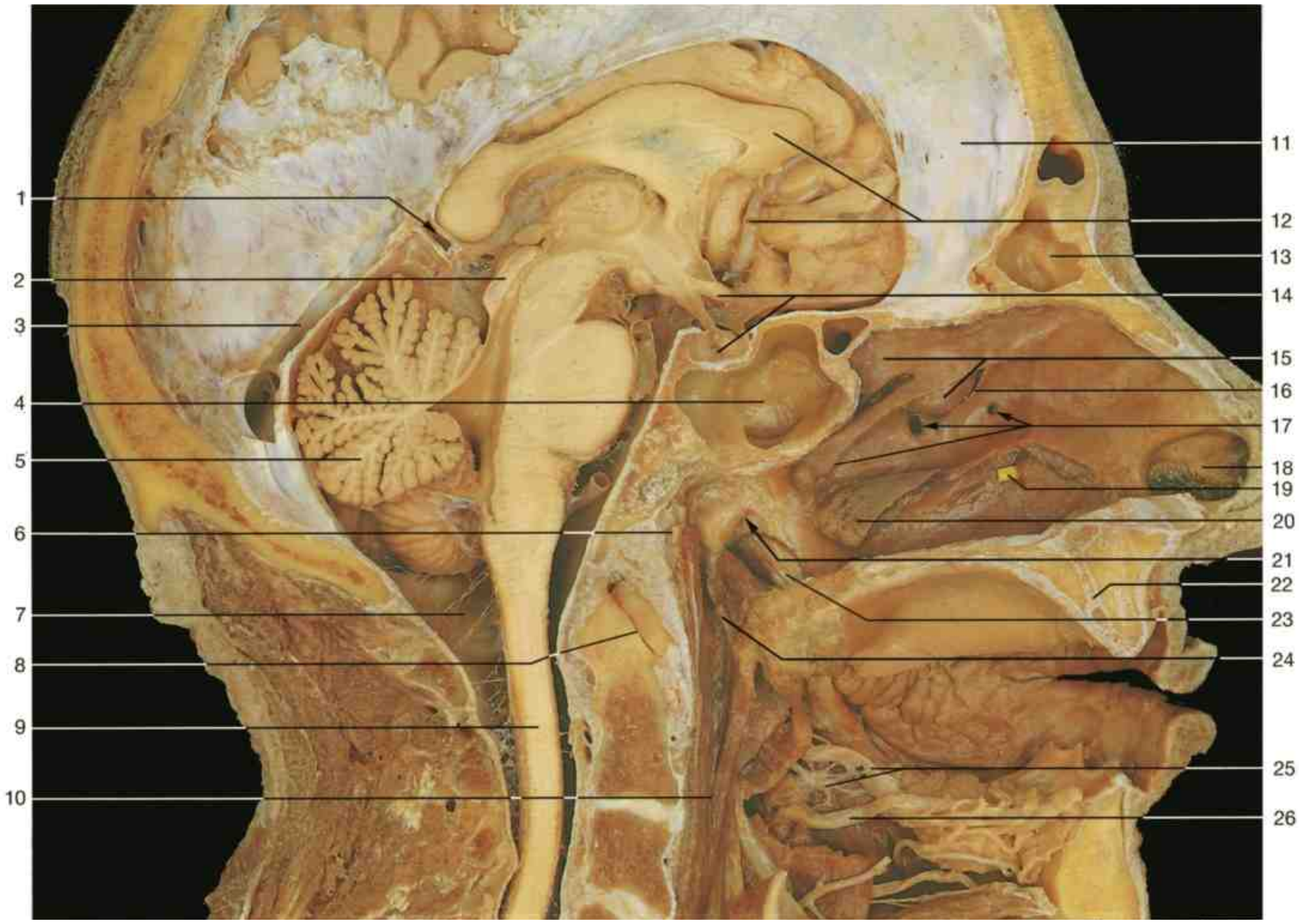
1 Sphenoidal sinus
2 Superior meatus
3 Middle meatus
4 Tubal elevation
5 Pharyngeal tonsil
6 Pharyngeal orifice of auditory tube
7 Salpingopharyngeal fold
8 Pharyngeal recess
9 Soft palate
10 Uvula
11 Frontal sinus
12 Spheno-ethmoidal recess
13 Superior nasal concha
14 Middle nasal concha
15 Inferior nasal concha
16 Vestibule
17 Inferior meatus
18 Hard palate
19 Grooves for the middle meningeal artery and parietal bone (yellow)
20 Maxillary hiatus
21 Perpendicular process of palatine bone
22 Openings of ethmoidal air cells
23 Opening of frontal sinus
24 Medial pterygoid plate (red)
25 Horizontal plate of palatine process
26 Ethmoidal air cells
27 Maxillary sinus
28 Nasal septum
29 Pterygoid hamulus
30 Nasal bone (white)
31 Frontal process of maxilla (violet)
32 Palatine process of maxilla (violet)
33 Nasal atrium



Bones of left nasal cavity (medial aspect).

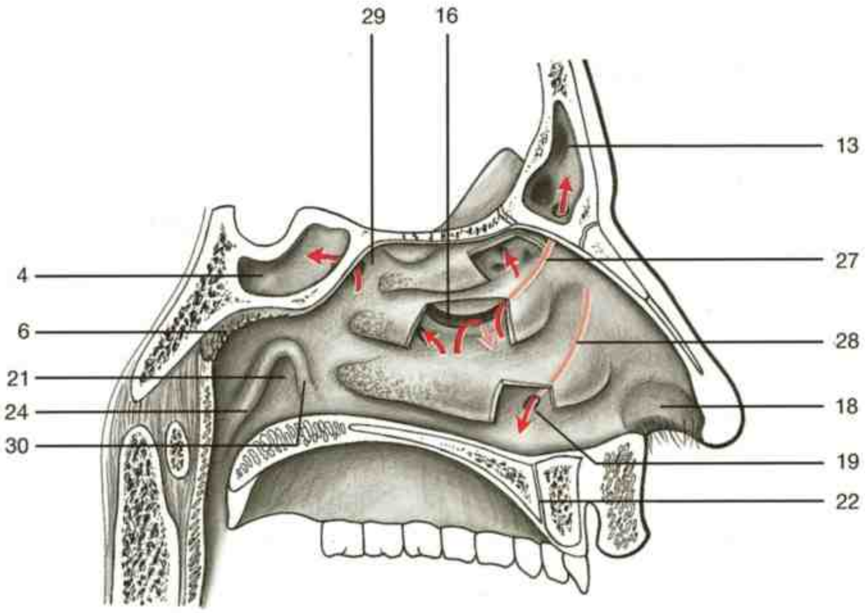


Schematic diagram showing the position of paranasal sinuses. Openings indicated by arrows.

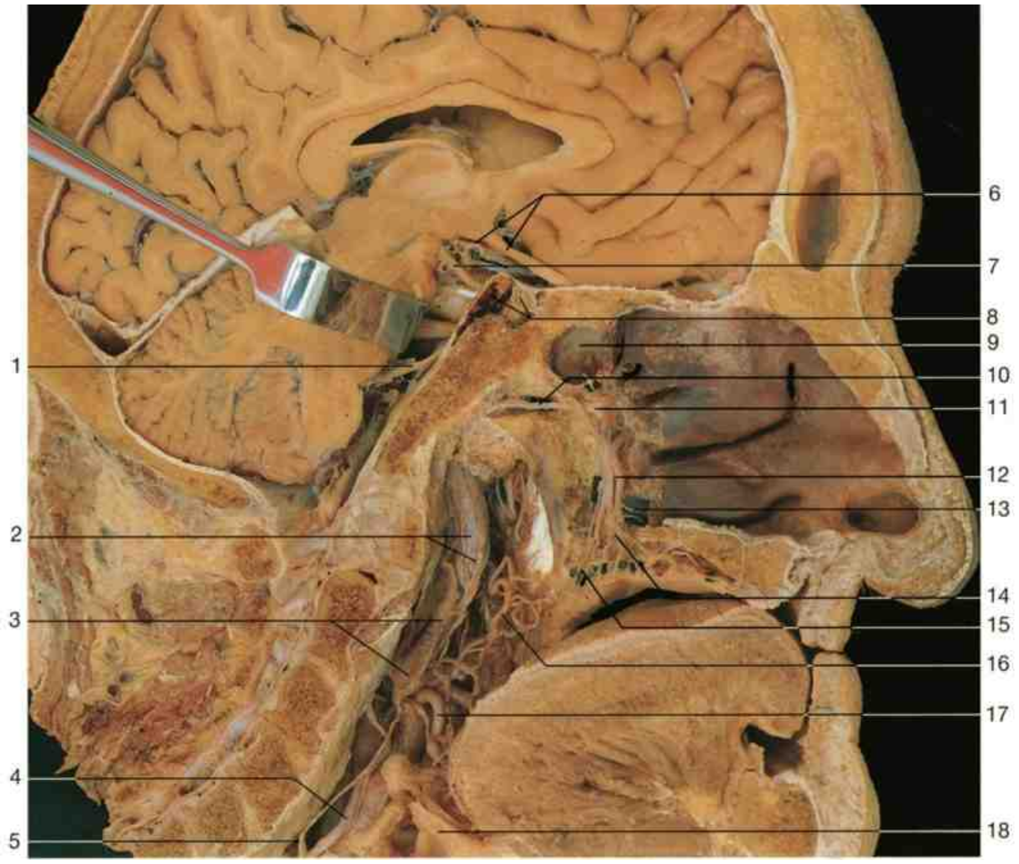


Median section through the head with nasal and oral cavities. The middle and inferior nasal conchae have been partly removed to show the openings of paranasal sinuses.

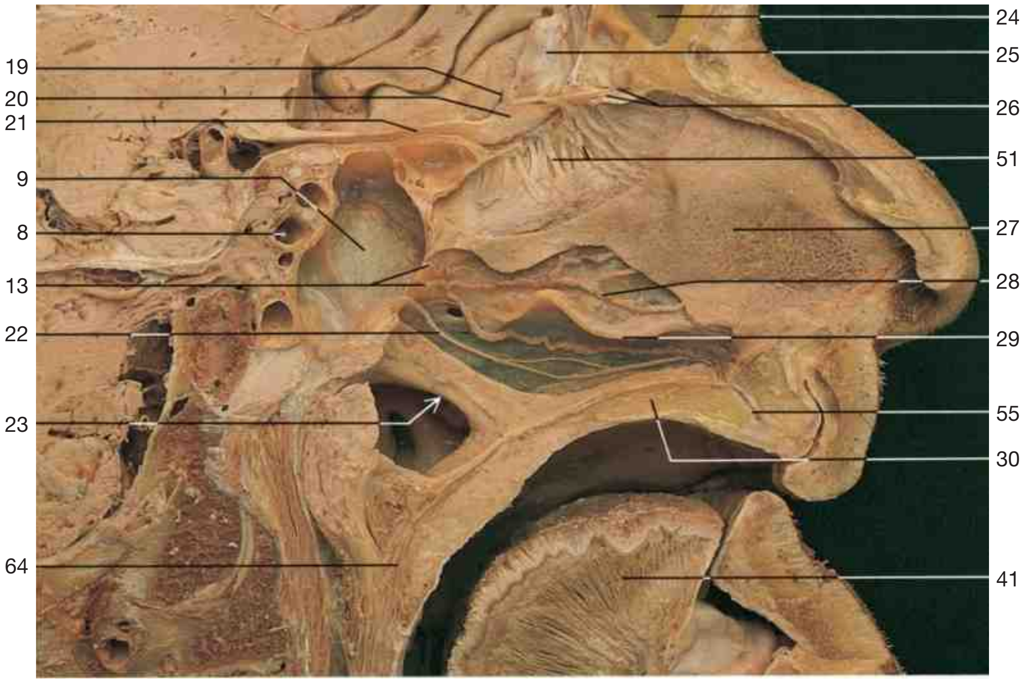
1 Great cerebral vein (Galen's vein)
2 Tectum of midbrain
3 Straight sinus
4 Sphenoidal sinus
5 Cerebellum
6 Pharyngeal tonsil
7 Cerebellomedullary cistern
8 Median atlanto-axial joint
9 Spinal cord
10 Oral part of pharynx
11 Falx cerebri
12 Corpus callosum and anterior cerebral artery
13 Frontal sinus
14 Optic chiasm and pituitary gland
15 Superior nasal concha and ethmoidal bulla
16 Semilunar hiatus
17 Accessory openings to maxillary sinus and cut edge of middle nasal concha
18 Vestibule
19 Opening of nasolacrimal duct
20 Inferior nasal concha (cut)
21 Opening of auditory tube
22 Incisive canal
23 Levator veli palatini muscle
24 Salpingopharyngeal fold
25 Lingual nerve and submandibular ganglion
26 Submandibular duct
27 Nasofrontal duct
28 Nasolacrimal duct
29 Spheno-ethmoidal recess (of Rosenmüller)
30 Salpingopalatine fold



Lateral wall of nasal cavity. Openings indicated by red arrows (schematic drawing).

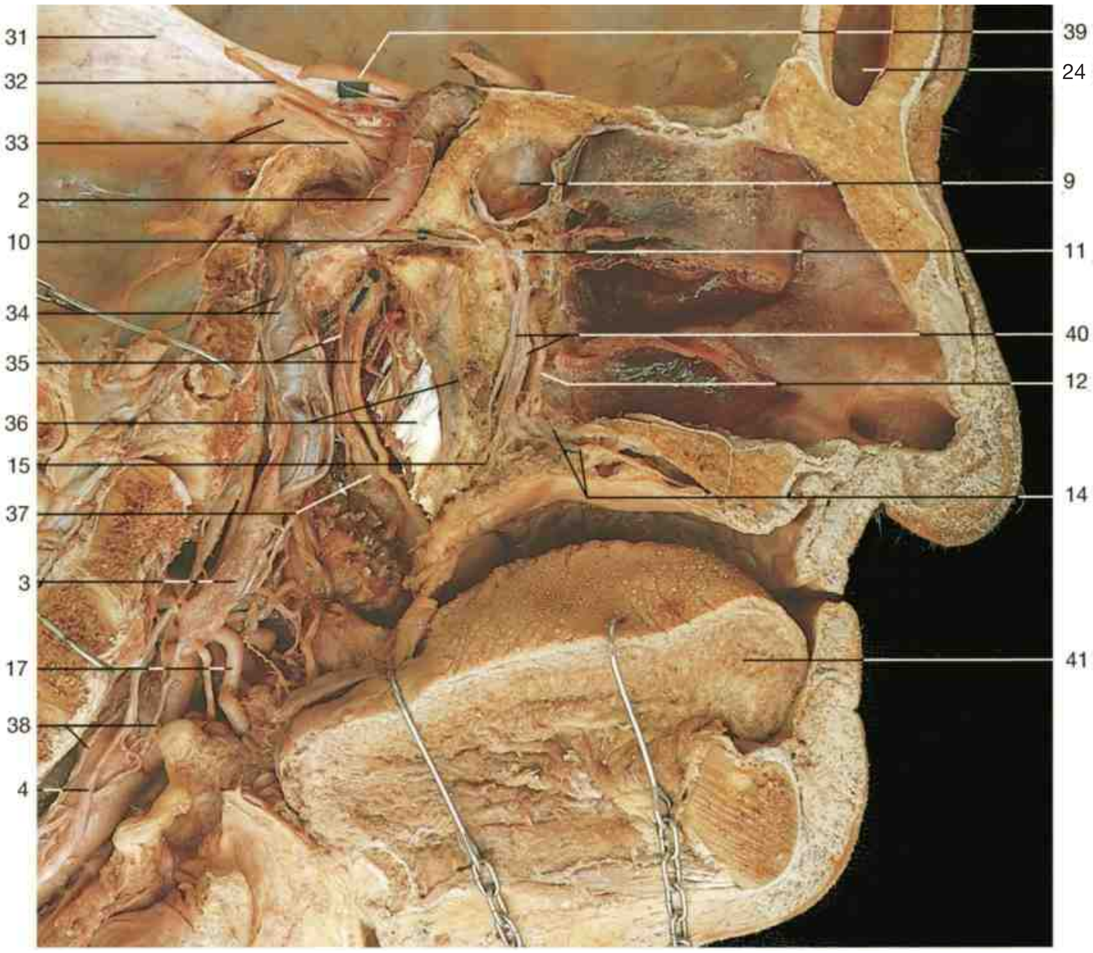


Nerves of the lateral wall of nasal cavity. Sagittal section through the head. Mucous membranes partly removed, pterygoid canal opened.



Nasal septum. Dissection of nerves and vessels.

1 Facial nerve
2 Internal carotid artery and internal carotid plexus
3 Superior cervical ganglion
4 Vagus nerve
5 Sympathetic trunk
6 Optic nerve and ophthalmic artery
7 Oculomotor nerve
8 Internal carotid artery and cavernous sinus
9 Sphenoidal sinus
10 Nerve of the pterygoid canal
11 Pterygopalatine ganglion
12 Descending palatine artery
13 Lateral inferior posterior nasal branches and lateral posterior nasal and septal arteries
14 Greater palatine nerves and artery
15 Lesser palatine nerves and arteries
16 Branches of ascending pharyngeal artery
17 Lingual artery
18 Epiglottis
19 Anterior ethmoidal artery
20 Olfactory bulb
21 Olfactory tract
22 Nasopalatine nerve
23 Choanae
24 Frontal sinus
25 Crista galli
26 Anterior ethmoidal artery and nerve, and nasal branch of anterior ethmoidal artery
27 Nasal septum
28 Septal artery
29 Crest of nasal septum
30 Hard palate
31 Tentorium cerebelli
32 Trochlear nerve
33 Trigeminal nerve with motor root
34 Internal carotid plexus
35 Lingual nerve with chorda tympani
36 Medial pterygoid muscle and medial pterygoid plate
37 Inferior alveolar nerve
38 Sympathetic trunk
39 Oculomotor nerve
40 Palatine nerves
41 Tongue
42 Trigeminal ganglion
43 Trigeminal nerve (n. V)
44 Facial nerve (n. VII)
45 Geniculate ganglion
46 Stylomastoid foramen
47 Medial pterygoid muscle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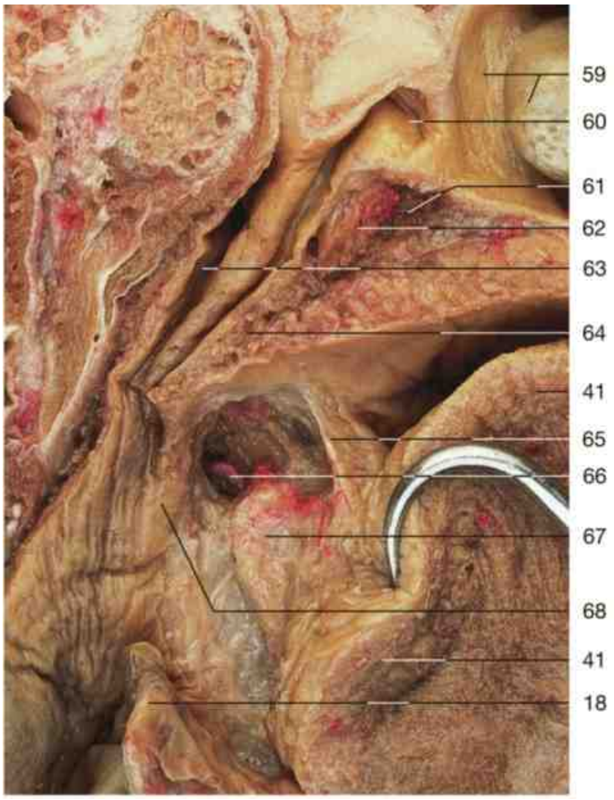
Nerves of the lateral wall of nasal cavity. Carotid canal opened, mucous membranes of pharynx and nasal cavity partly removed.

48	Greater petrosal nerve
49	Maxillary nerve
50	Olfactory bulb
51	Olfactory nerves
52	Internal nasal branches of anterior ethmoidal nerve
53	Lateral superior posterior nasal branches
54	Lateral inferior posterior nasal branches
55	Incisive canal with nasopalatine nerve
56	Greater palatine nerve
57	Deep petrosal nerve
58	Mandibular nerve
59	Nasal cavity and inferior nasal concha
60	Opening of auditory tube
61	Tensor veli palatini muscle
62	Levator veli palatini muscle
63	Pharyngeal recess in the nasopharynx
64	Uvula
65	Palatoglossal arch
66	Tonsillar branch of ascending palatine artery
67	Palatine tonsil
68	Palatopharyngeal arch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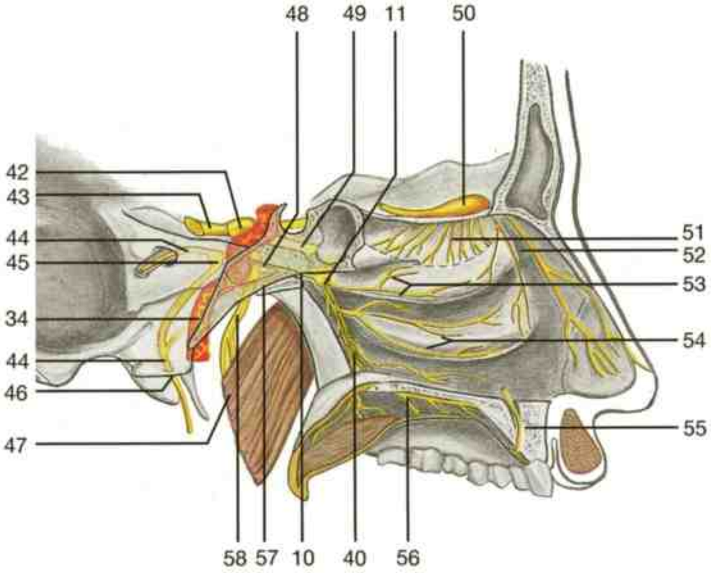
Dissection of palatine tonsil located in the lateral wall of the nasopharynx (left side). Root of tongue reflected.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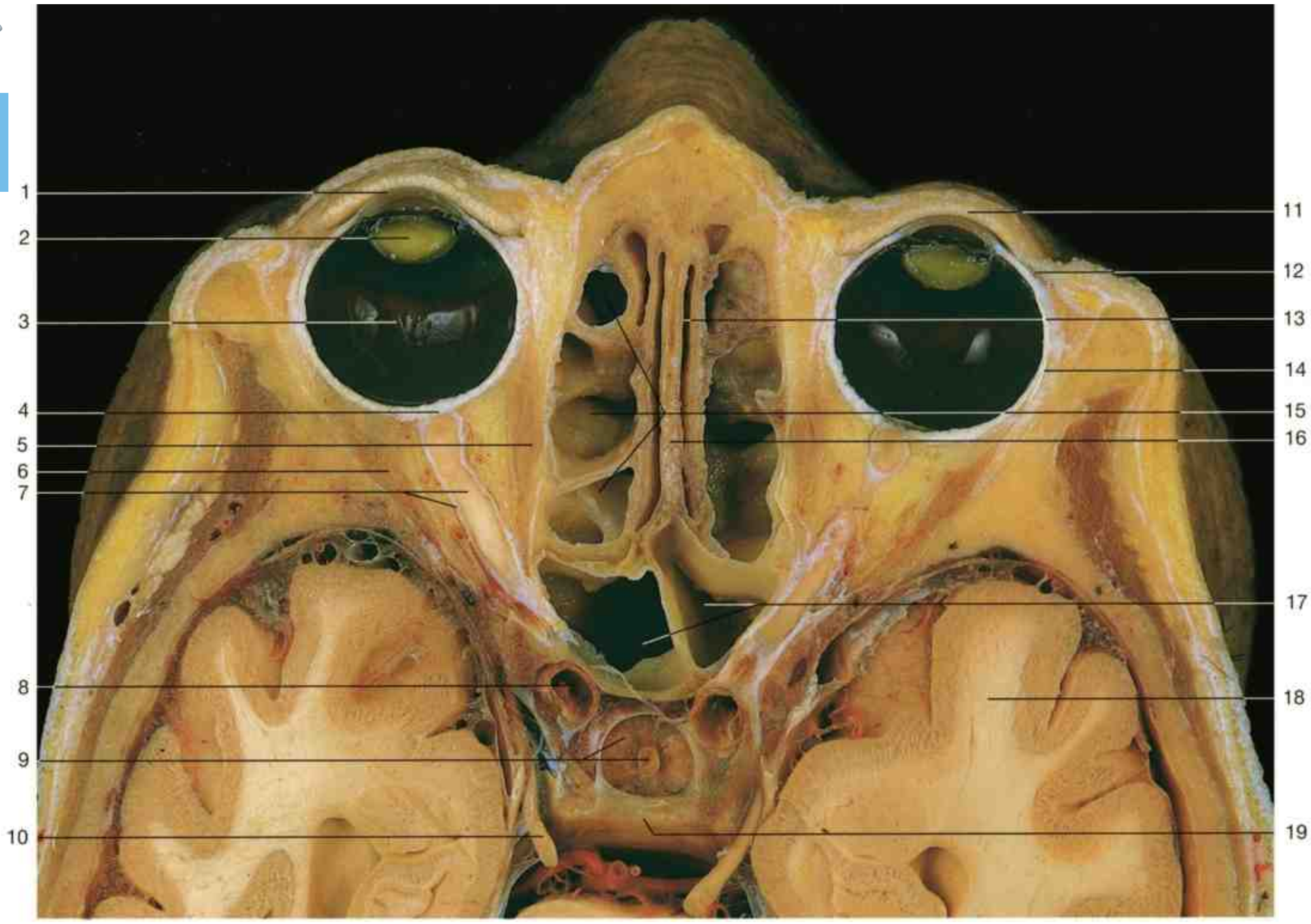
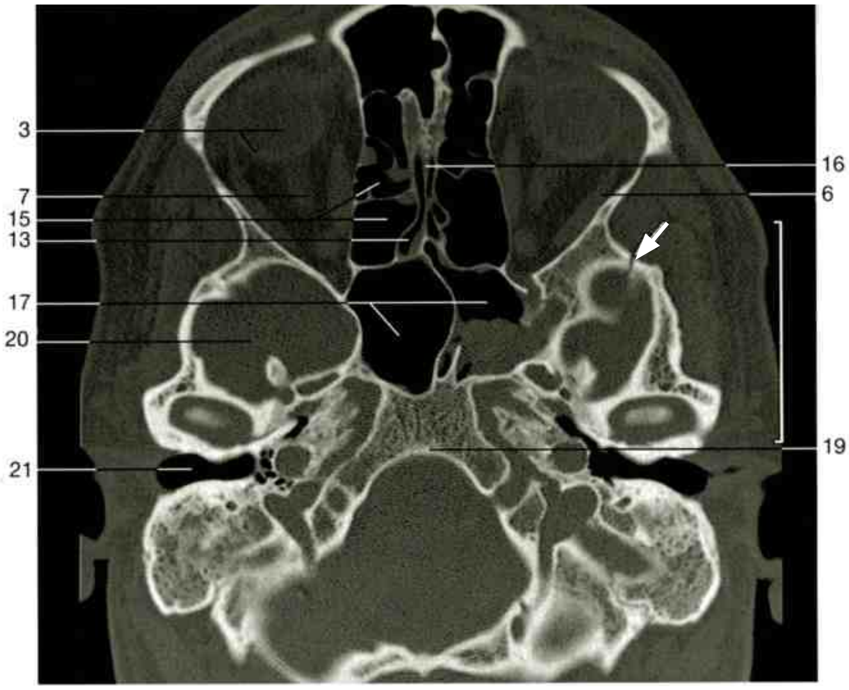
Nerves of the lateral wall of nasal cavity. Body of sphenoid bone appears transparent (schematic drawing).

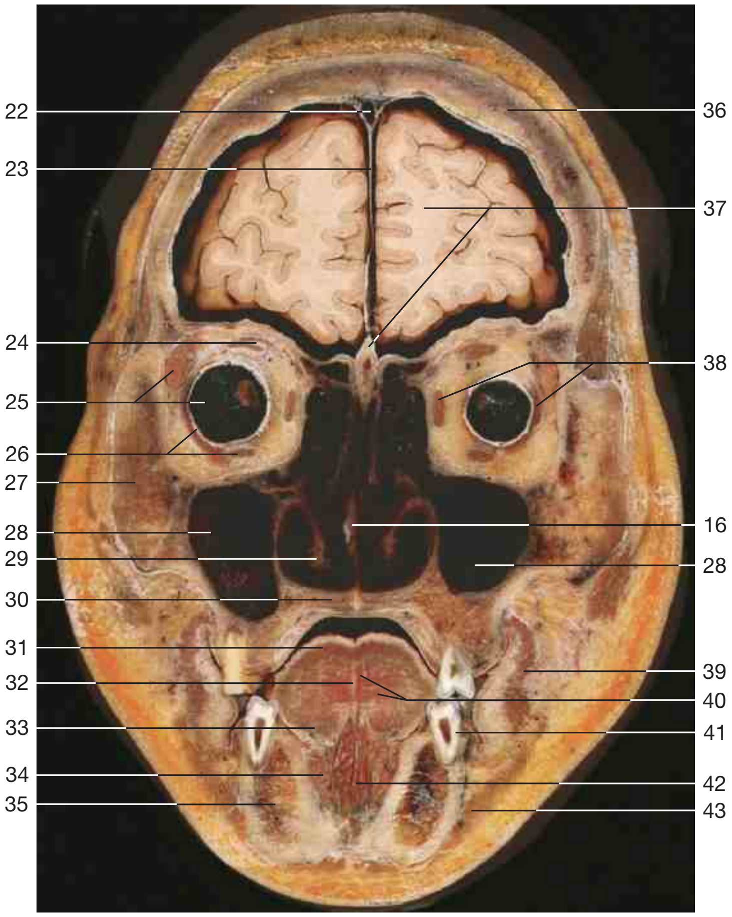


Horizontal section through the nasal cavity, the orbits, and temporal lobes of the brain at the level of pituitary gland.



Horizontal section through the head. CT scan. Bar = 2 cm.
Arrow: fracture.

1 Cornea
2 Lens
3 Vitreous body (eyeball)
4 Head of optic nerve
5 Medial rectus muscle
6 Lateral rectus muscle
7 Optic nerve with dural sheath
8 Internal carotid artery
9 Pituitary gland and infundibulum
10 Oculomotor nerve
11 Superior tarsal plate of eyelid
12 Fornix of conjunctiva
13 Nasal cavity
14 Sclera
15 Ethmoidal sinus
16 Nasal septum
17 Sphenoidal sinus
18 Temporal lobe
19 Clivus
20 Middle cranial fossa
21 External acoustic meatus
22 Superior sagittal sinus
23 Falx cerebri
24 Superior rectus and levator palpebrae superioris muscles
25 Eyeball and lacrimal gland
26 Inferior rectus and inferior oblique muscles
27 Zygomatic bone
28 Maxillary sinus
29 Inferior nasal concha
30 Hard palate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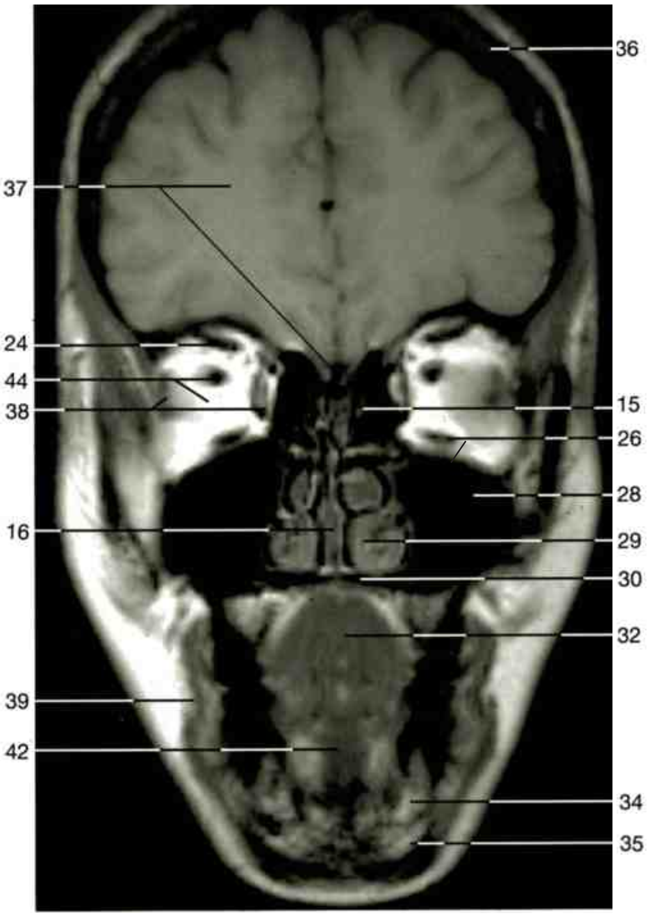
Coronal section through the head at the level of the second premolar of the mandible.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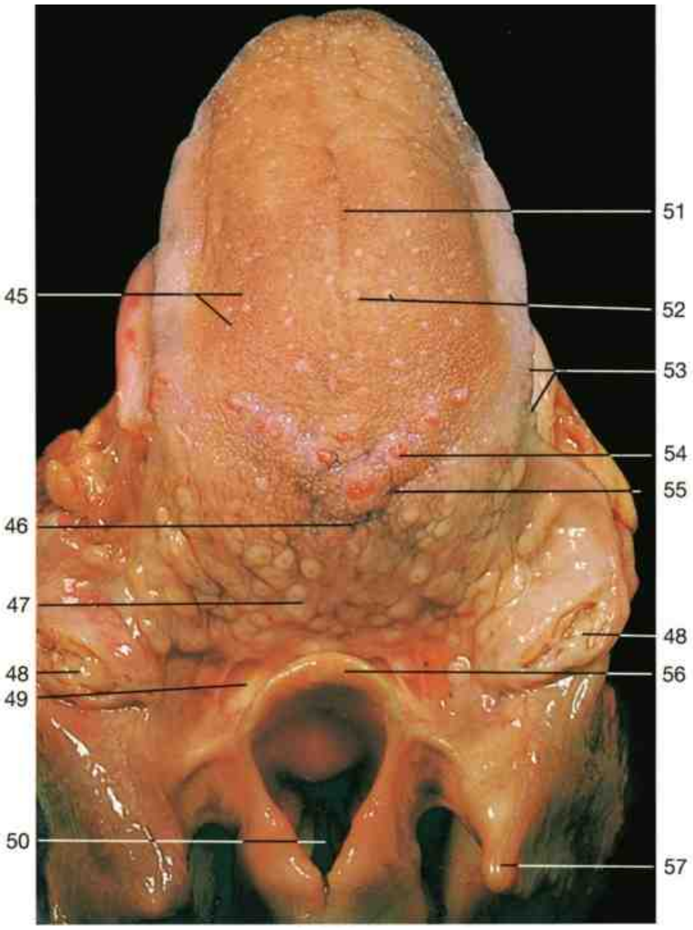
Coronal section through the head (MRI scan, courtesy of Prof. Heuck, Munich, Germany). Note the situation of the head cavities.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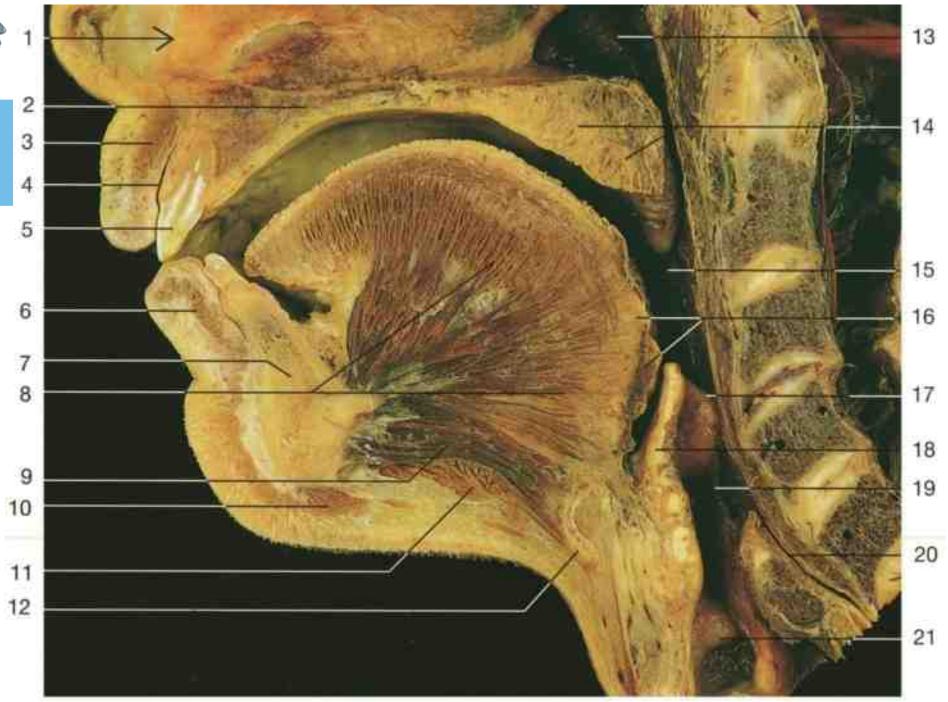
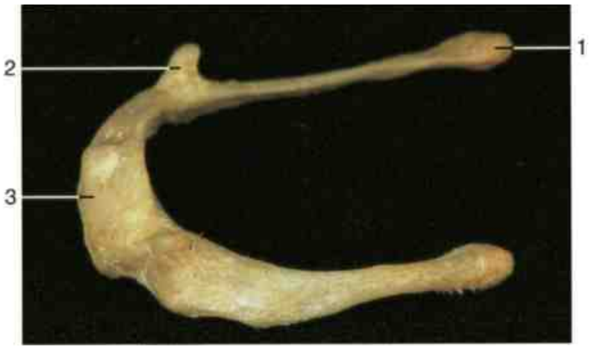
31 Superior longitudinal muscle of tongue
32 Lingual septum
33 Inferior longitudinal muscle of tongue
34 Sublingual gland
35 Mandible
36 Calvaria
37 Frontal lobe of brain and crista galli
38 Lateral and medial rectus muscles
39 Buccinator muscle
40 Vertical and transverse muscles of tongue
41 Second premolar of mandible
42 Genioglossus muscle
43 Platysma muscle
44 Orbit and optic nerve
45 Filiform papillae
46 Foramen cecum
47 Root of tongue (lingual tonsil)
48 Palatine tonsil
49 Vallecula of epiglottis
50 Vestibule of larynx
51 Median sulcus of tongue
52 Fungiform papillae
53 Foliate papillae
54 Circumvallate papilla
55 Sulcus terminalis
56 Epiglottis
57 Greater cornu of hyoid bone

◁ **Dorsal surface of the tongue and laryngeal inlet.**

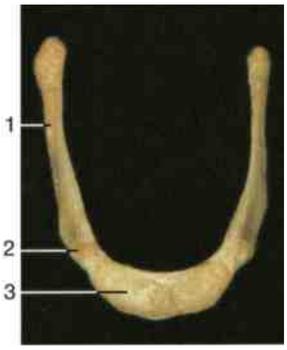


1 Nasal cavity
2 Hard palate
3 Upper lip and orbicularis oris muscle
4 Vestibule of oral cavity
5 First incisor
6 Lower lip and orbicularis oris muscle
7 Mandible
8 Genioglossus muscle
9 Geniohyoid muscle
10 Anterior belly of diagastric muscle
11 Mylohyoid muscle
12 Hyoid bone
13 Nasopharynx
14 Soft palate and uvula
15 Oropharynx
16 Root of tongue and lingual tonsil
17 Laryngopharynx
18 Epiglottis
19 Ary-epiglottic fold
20 Laryngopharynx continuous with esophagus
21 Larynx

Median sagittal section through the oral cavity and pharynx.

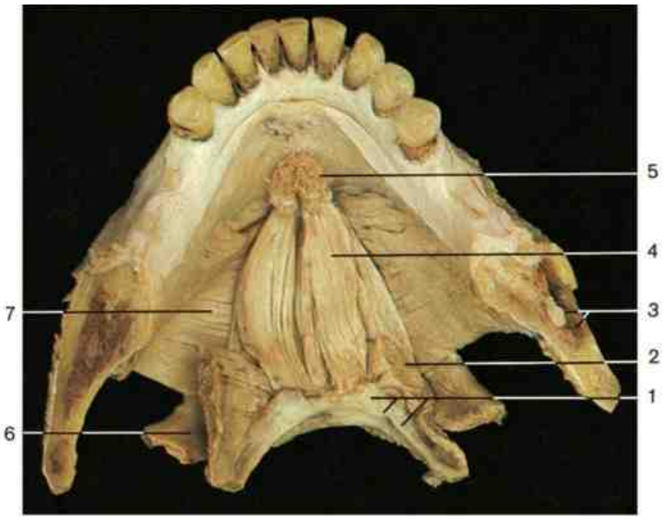


Hyoid bone (oblique lateral aspect).



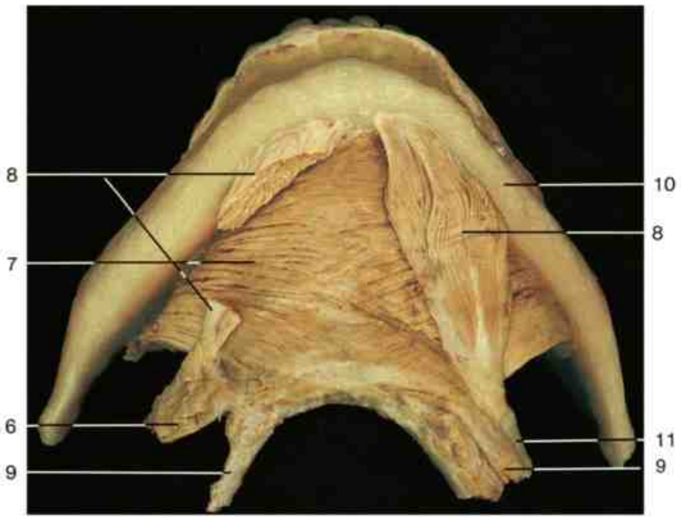
Hyoid bone (anterior aspect).

1 Greater cornu } of hyoid bone
2 Lesser cornu
3 Body



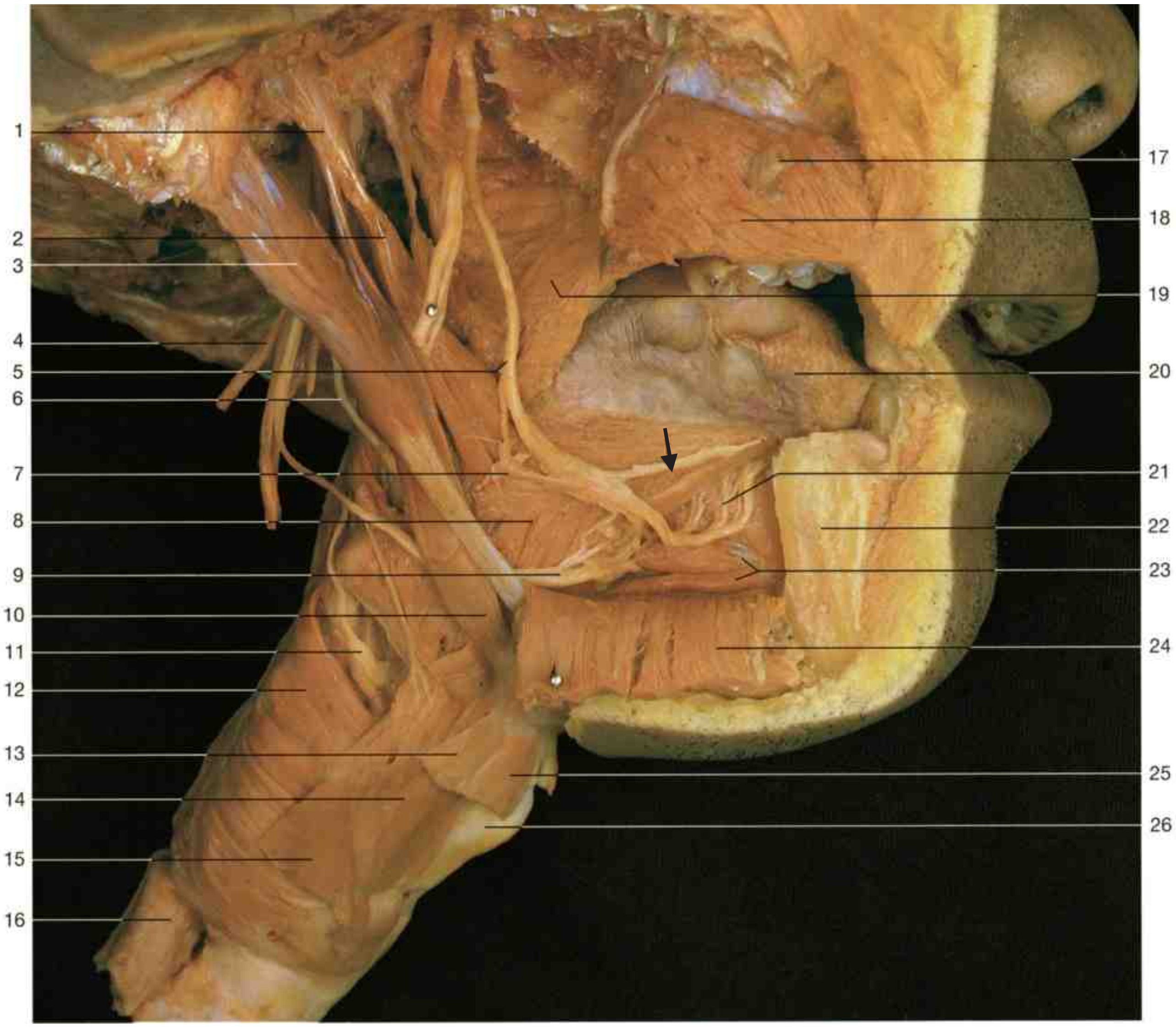
Muscles of the floor of the oral cavity (superior aspect).

1 Lesser cornu and body of hyoid bone
2 Hyoglossus muscle (divided)
3 Ramus of mandible and inferior alveolar nerve
4 Geniohyoid muscle
5 Genioglossus muscle (divided)
6 Stylohyoid muscle (divided)

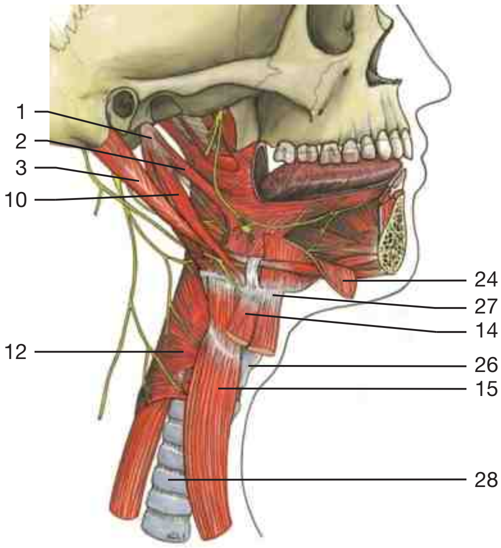


Oral diaphragm, muscles (inferior aspect). Cut on the base.

7 Mylohyoid muscle
8 Anterior belly of digastric muscle
9 Hyoid bone
10 Mandible
11 Intermediate tendon of digastric muscle

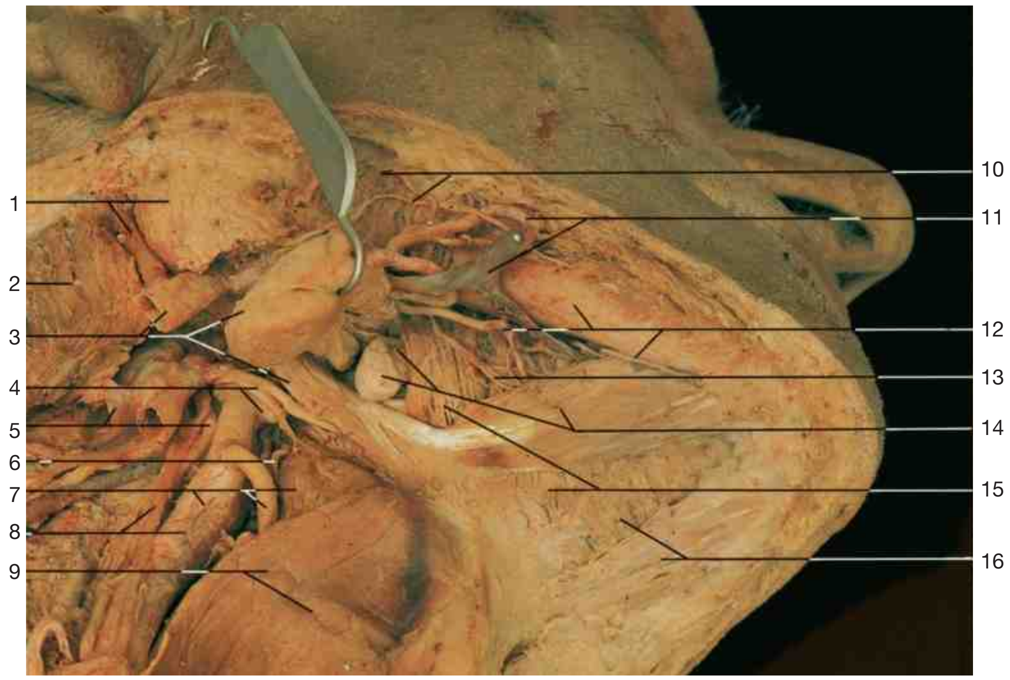


Parapharyngeal and sublingual regions. Innervation of the tongue. Lateral part of face and mandible removed, oral cavity opened. Arrow: submandibular duct.

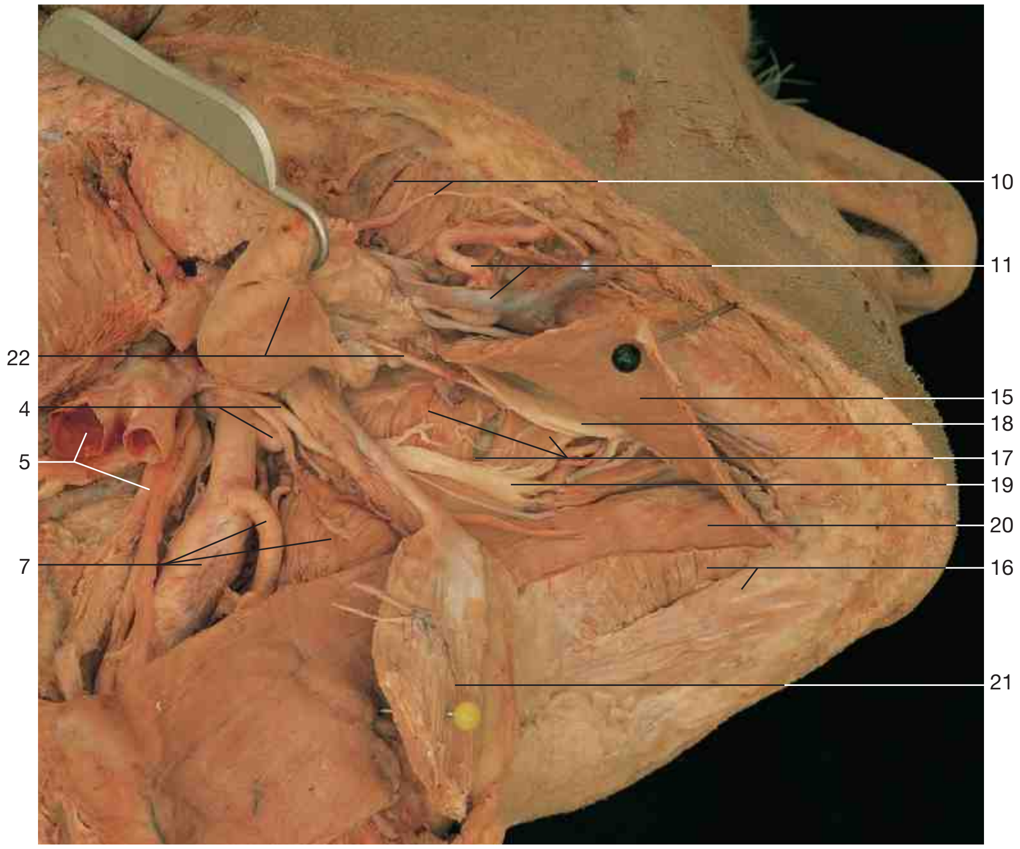


Supra- and infrahyoid muscles and pharynx (schematic drawing).

1 Styloid process
2 Styloglossus muscle
3 Digastric muscle (posterior belly)
4 Vagus nerve (n. X)
5 Lingual nerve (n. V$_3$)
6 Glossopharyngeal nerve (n. IX)
7 Submandibular ganglion
8 Hyoglossus muscle
9 Hypoglossal nerve (n. XII)
10 Stylohyoid muscle
11 Internal branch of superior laryngeal nerve (branch of vagus nerve, not visible)
12 Middle constrictor muscle of pharynx
13 Omohyoid muscle (divided)
14 Thyrohyoid muscle
15 Sternothyroid muscle
16 Esophagus
17 Parotid duct (divided)
18 Buccinator
19 Superior constrictor muscle of pharynx
20 Tongue
21 Terminal branches of lingual nerve
22 Mandible (divided)
23 Genioglossus and geniohyoid muscles
24 Mylohyoid muscle (divided and reflected)
25 Sternohyoid muscle (divided)
26 Thyroid cartilage
27 Hyoid bone
28 Trachea

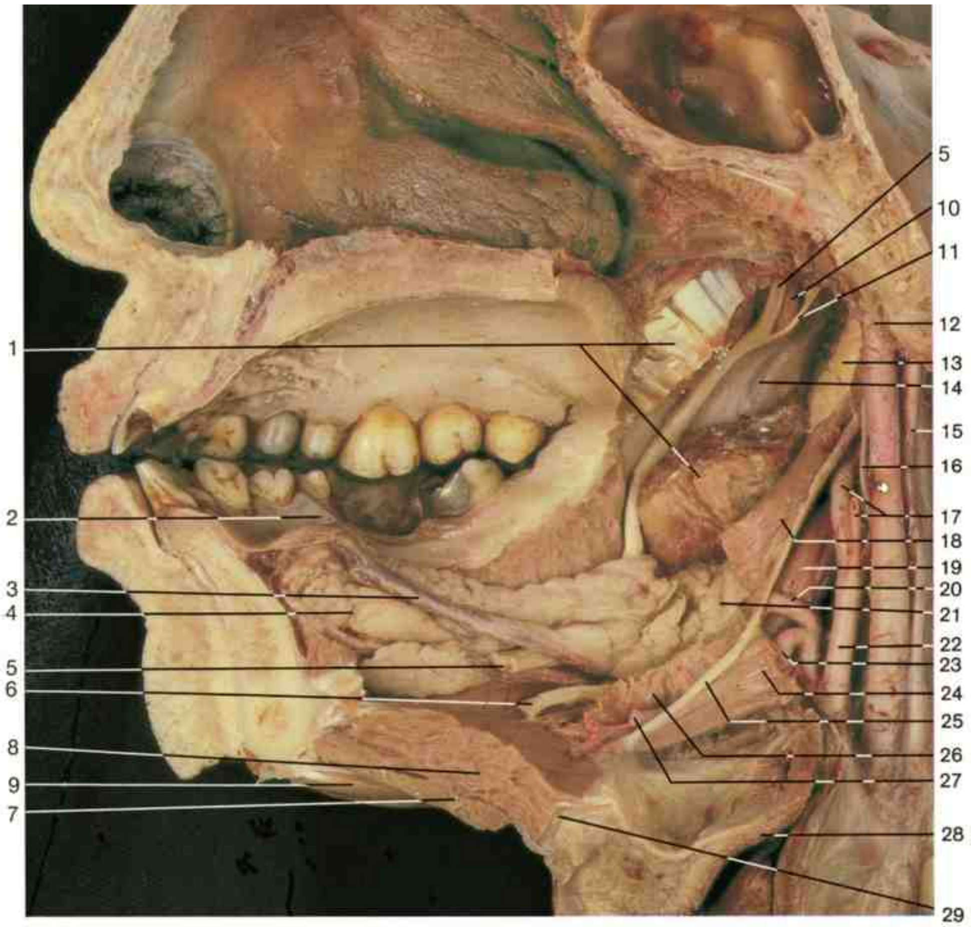


Submandibular triangle, superficial dissection. Right side (inferior aspect). Submandibular gland has been reflected.



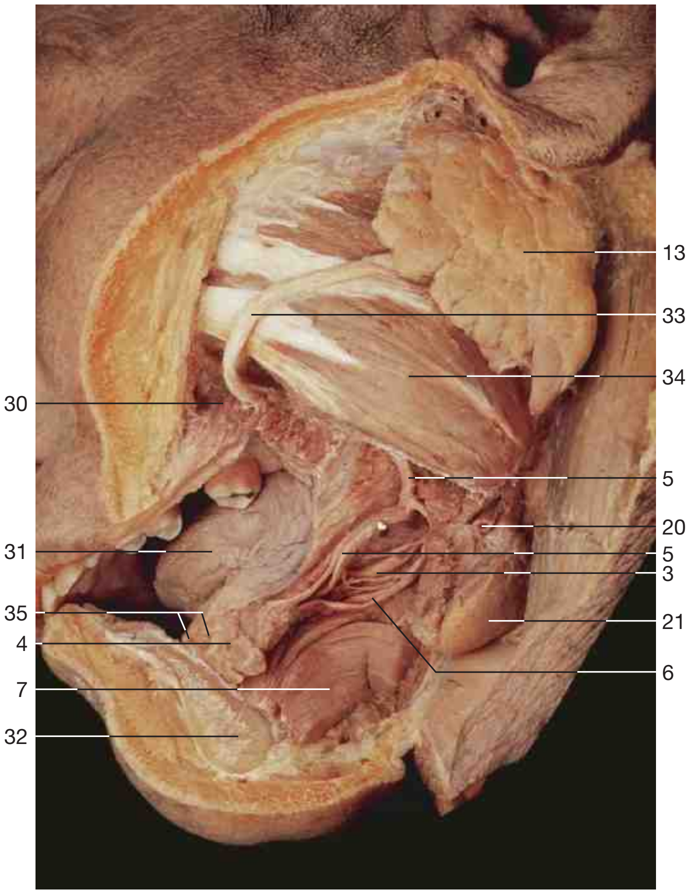
Submandibular triangle, deep dissection. Right side (inferior aspect). Mylohyoid muscle has been severed and reflected to display the lingual and hypoglossal nerves.

1 Parotid gland and retromandibular vein
2 Sternocleidomastoid muscle
3 Retromandibular vein, submandibular gland, and stylohyoid muscle
4 Hypoglossal nerve and lingual artery
5 Vagus nerve and internal jugular vein
6 Superior laryngeal artery
7 External carotid artery, thyrohyoid muscle, and superior thyroid artery
8 Common carotid artery and superior root of ansa cervicalis
9 Omohyoid and sternohyoid muscles
10 Masseter muscle and marginal mandibular branch of facial nerve
11 Facial artery and vein
12 Mandible and submental artery and vein
13 Mylohyoid nerve
14 Submandibular duct, sublingual gland, and anterior belly of digastric muscle
15 Mylohyoid muscle
16 Mylohyoid muscle and anterior belly of left digastric muscle
17 Hyoglossus muscle and lingual artery
18 Lingual nerve
19 Hypoglossal nerve
20 Geniohyoid muscle
21 Anterior belly of right digastric muscle
22 Submandibular gland and duct

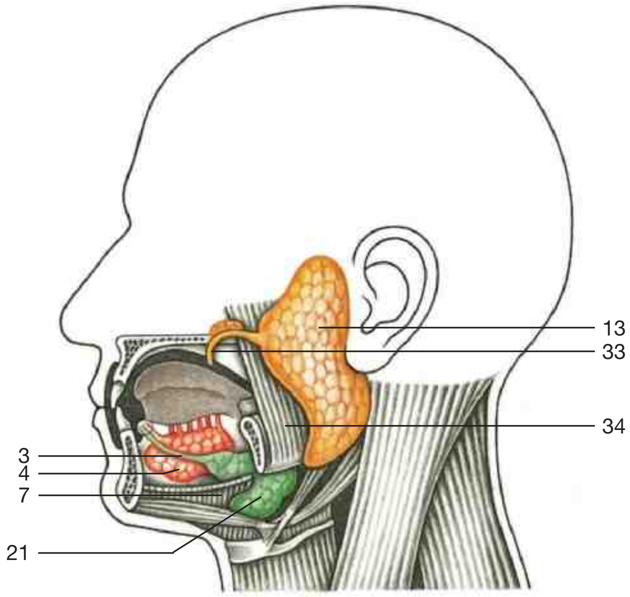


Oral cavity (internal aspect). Tongue and pharyngeal wall removed.

1	Medial pterygoid muscle
2	Sublingual papilla
3	Submandibular duct
4	Sublingual gland
5	Lingual nerve
6	Hypoglossal nerve
7	Mylohyoid muscle
8	Geniohyoid muscle
9	Anterior belly of digastric muscle
10	Inferior alveolar nerve
11	Chorda tympani
12	Internal carotid artery
13	Parotid gland
14	Sphenomandibular ligament
15	Vagus nerve
16	Glossopharyngeal nerve
17	Superficial temporal artery and ascending pharyngeal artery
18	Styloglossus muscle
19	Posterior belly of digastric muscle
20	Facial artery
21	Submandibular gland
22	External carotid artery
23	Lingual artery
24	Middle pharyngeal constrictor muscle
25	Stylohyoid ligament
26	Hyoglossus muscle
27	Deep lingual artery
28	Epiglottis
29	Hyoid bone
30	Buccinator muscle
31	Tongue
32	Mandible (divided)
33	Parotid duct
34	Masseter muscle
35	Right and left sublingual papillae

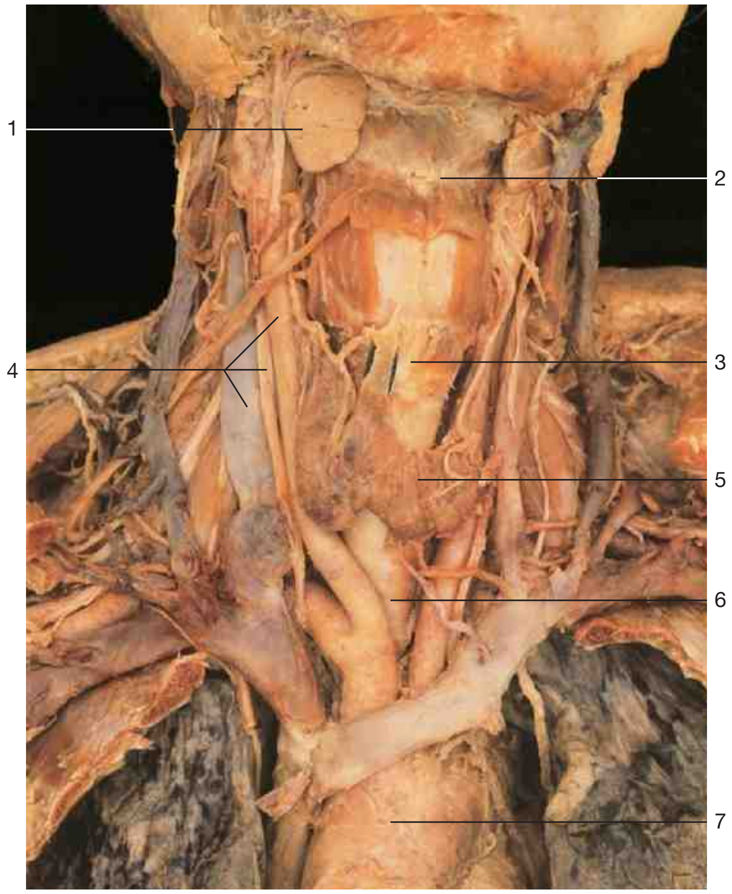


Dissection of major salivary glands. Left mandible and buccinator muscle partly removed to view the oral cavity (infero-lateral aspect).



Location of the major salivary glands in relation to the oral cavity.

2.5 Neck and Organs of the Neck

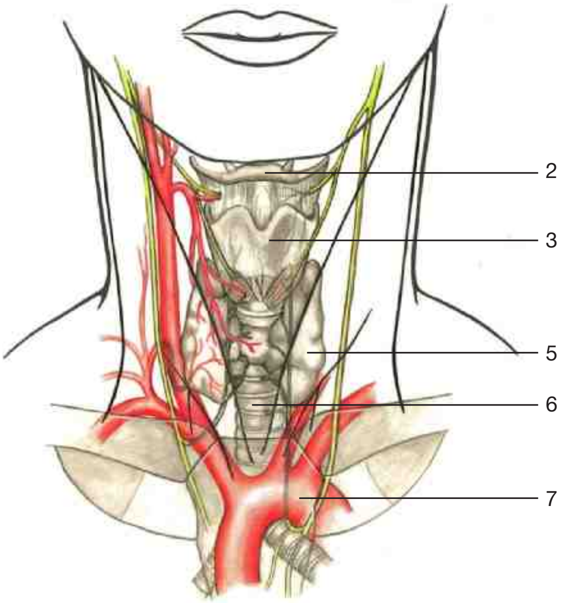


Regional anatomy of the neck (anterior aspect). The anteriorly located muscles and the thoracic wall have been removed.

The anterior aspect of the neck contains the trachea and larynx, which are connected to the nasal cavity via the pharynx. Behind the trachea lies the esophagus, which is connected to the oral cavity, again via the pharynx.

The thyroid gland is located anterior to the trachea, whereas the carotid artery and jugular vein together with the vagus nerve are situated laterally, conjoining the head with the thoracic organs and upper limb.

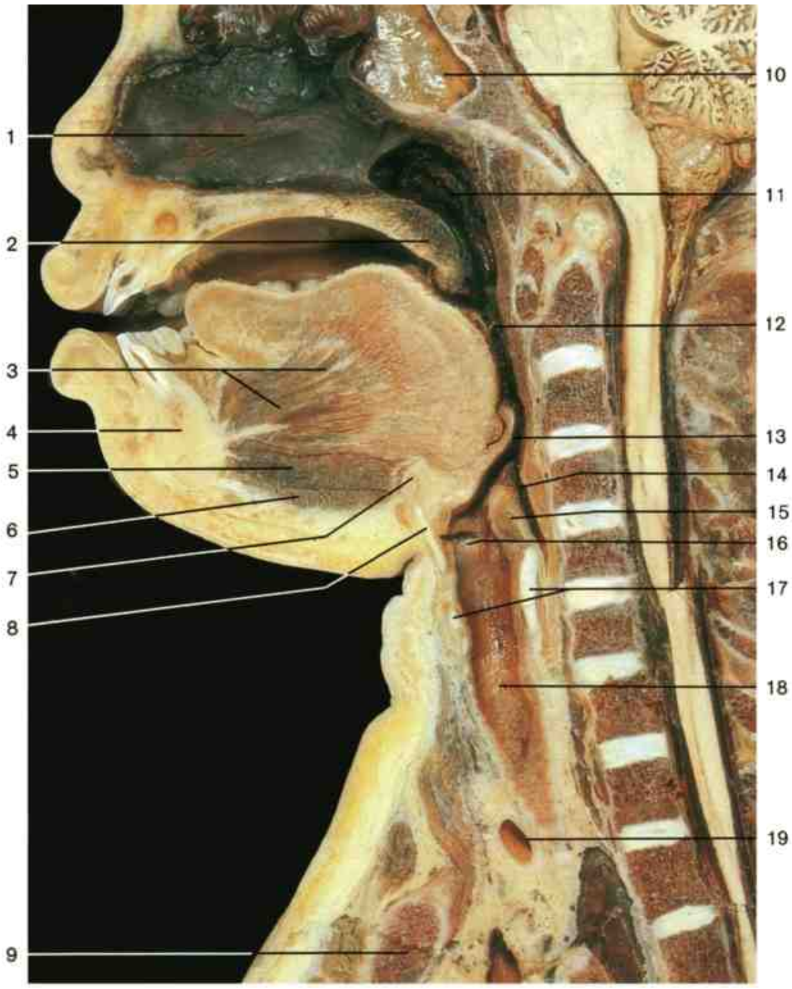
Underneath the sternocleidomastoid muscle, the cervical portion of the spinal nerves forms the cervical and brachial nervous plexuses that give rise to the innervations of neck and upper limb respectively.



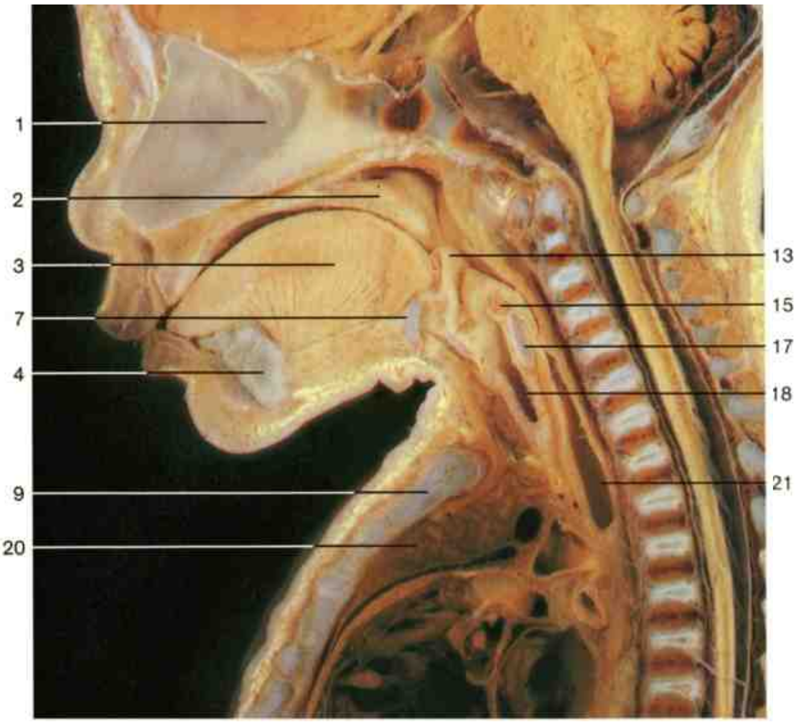
Organs of the neck (anterior aspect, schematic drawing). The main arterial trunks are indicated in red.

1 Submandibular gland
2 Hyoid bone
3 Larynx (thyroid cartilage)
4 Nerves and vessels of the neck
(carotid artery, internal jugular vein, and vagus nerve)
5 Thyroid gland
6 Trachea
7 Aortic arch

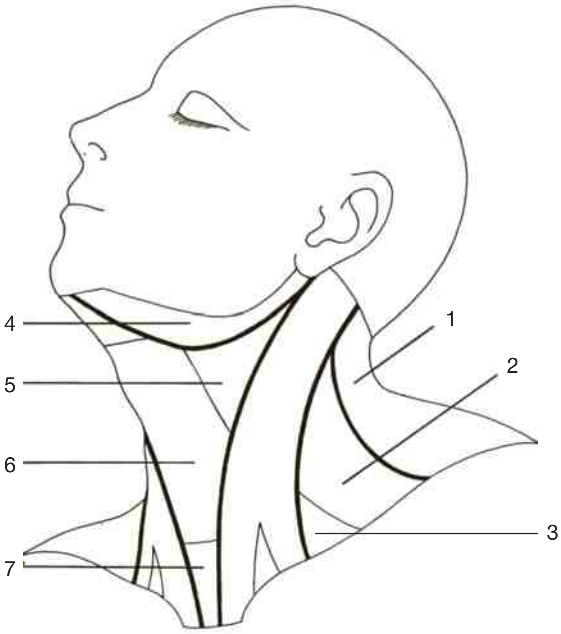
1	Nasal septum
2	Uvula
3	Genioglossus muscle
4	Mandible
5	Geniohyoid muscle
6	Mylohyoid muscle
7	Hyoid bone
8	Thyroid cartilage
9	Manubrium sterni
10	Sphenoidal sinus
11	Nasopharynx
12	Oropharynx
13	Epiglottis
14	Laryngopharynx
15	Arytenoid muscle
16	Vocal fold
17	Cricoid cartilage
18	Trachea
19	Left brachiocephalic vein
20	Thymus
21	Esophagus



Median section through adult head and neck. Note the low position of the adult larynx when compared with that of the neonate (cf. with the figure below).

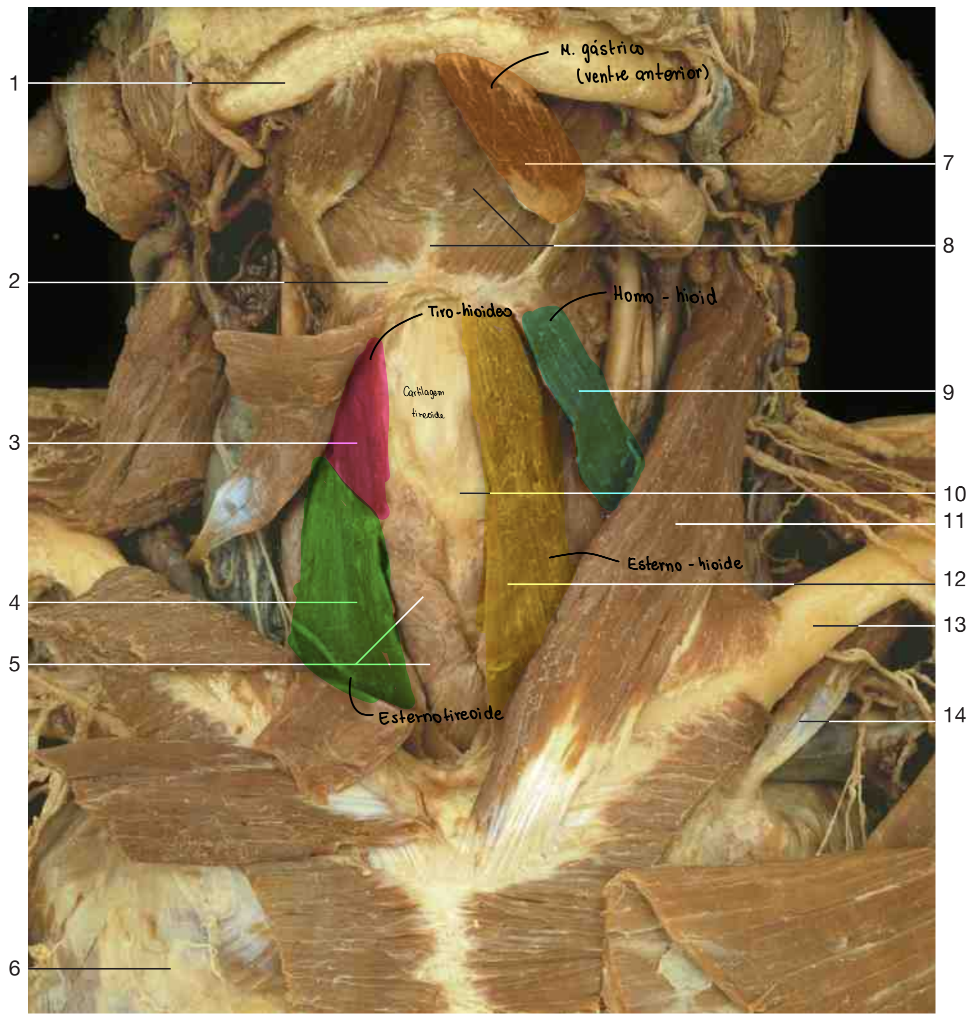


Median section through neonate head and neck. Note the high position of the larynx permitting the epiglottis to nearly reach the uvula (cf. with the figure above).



Regions and triangles of the neck (schematic drawing).

1	Posterior cervical region
2	Lateral cervical region
3	Supraclavicular triangle
4	Submandibular triangle
5	Carotid triangle
6	Anterior cervical region
7	Jugular fossa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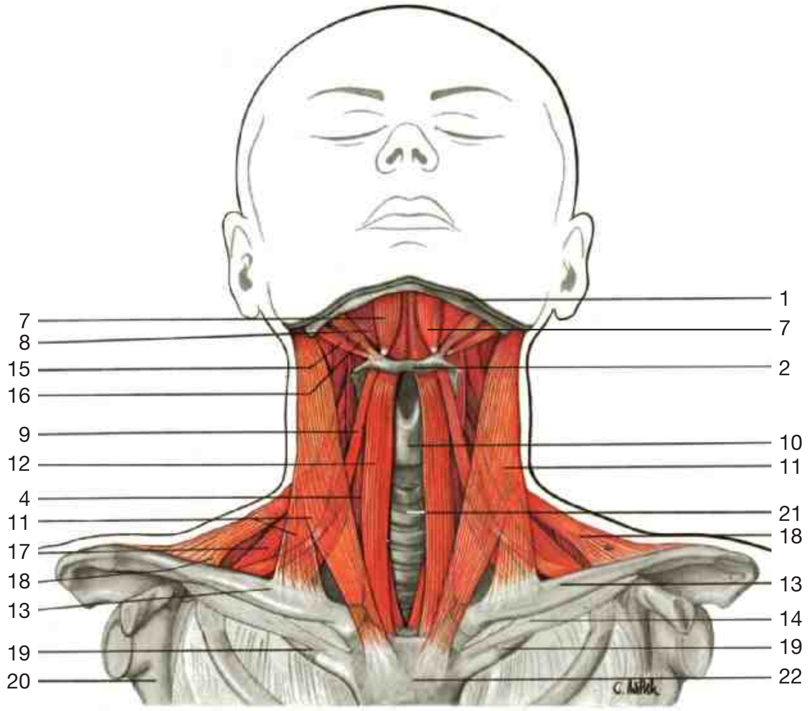
M. gástrico
(ventre anterior)
Tiro-hioideo
Homo - hioid
Cartilagem
tireoide
Esterno - hioide
Esternotireoide

Muscles of the neck (anterior aspect). Sternocleidomastoid and sternohyoid muscles on the right have been divided and reflected.

1	Mandible
2	Hyoid bone
3	Thyrohyoid muscle
4	Sternothyroid muscle
5	Thyroid gland
6	Second rib
7	Anterior belly of digastric muscle
8	Mylohyoid muscle (and mylohyoid raphe)
9	Omohyoid muscle
10	Thyroid cartilage
11	Sternocleidomastoid muscle
12	Sternohyoid muscle
13	Clavicle
14	Subclavius muscle
15	Posterior belly of digastric muscle
16	Stylohyoid muscle
17	Scalenus muscles
18	Trapezius muscle
19	First rib
20	Scapula
21	Trachea
22	Manubrium sterni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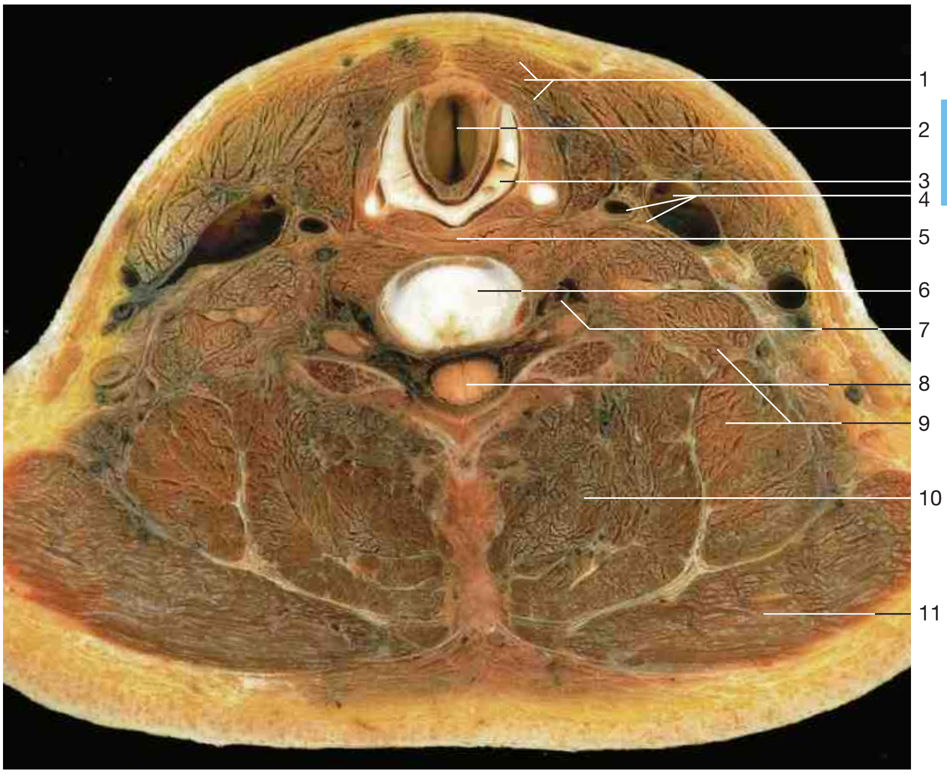
C. Wittek

Muscles of the neck (anterior aspect, schematic drawing).

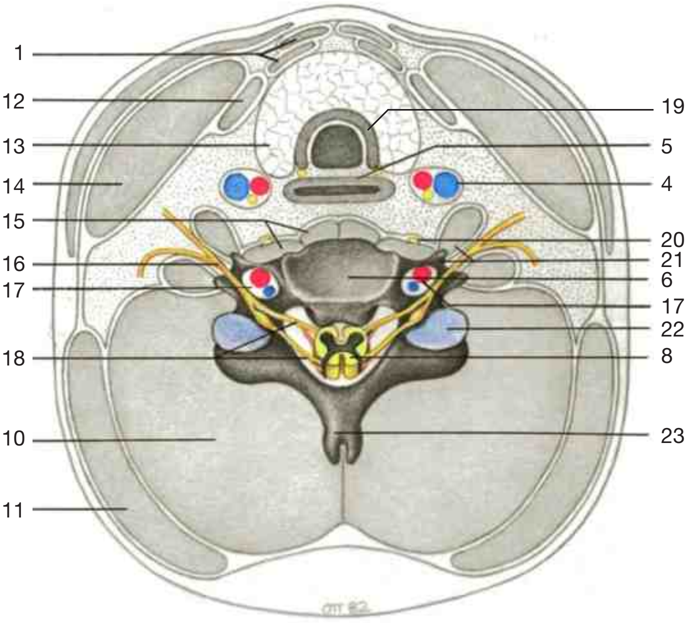
The muscles of the neck are complex and highly sophisticated. There are two major groups of muscles to be distinguished according to their functional aspects. One group is constituted by muscles connecting head to the hyoid bone and the larynx. The second category of muscles links the head and the ribcage.

The sternocleidomastoid muscle represents the border between the anterior and posterior cervical triangle.

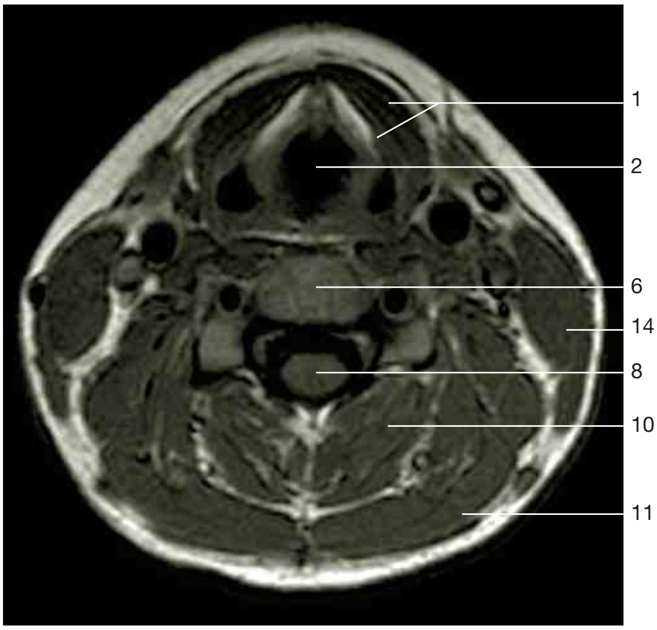
1 Sternohyoid and thyrohyoid muscles
2 Larynx
3 Cricoid cartilage
4 Internal jugular vein, common carotid artery, and vagus nerve
5 Esophagus
6 Body of cervical vertebra
7 Vertebral artery
8 Spinal cord
9 Scalenus posterior muscle
10 Deep muscles of the neck
11 Trapezius muscle
12 Omohyoid muscle
13 Thyroid gland
14 Sternocleidomastoid muscle
15 Longus colli and longus capitis muscles
16 Cervical spinal nerve
17 Vertebral artery and vein, and foramen transversarium
18 Ventral and dorsal root of cervical spinal nerve
19 Trachea
20 Sympathetic trunk
21 Anterior tubercle of transverse process and origin of scalenus anterior and medius muscles
22 Superior facet of articular process
23 Spinous process



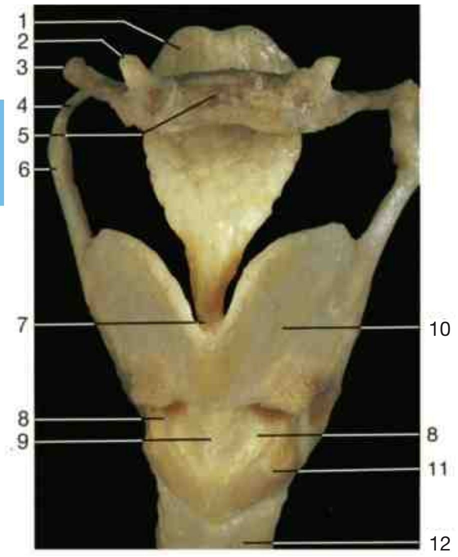
Axial section of the neck at the level of the intervertebral disc between the 5th and 6th cervical vertebra (inferior aspect).



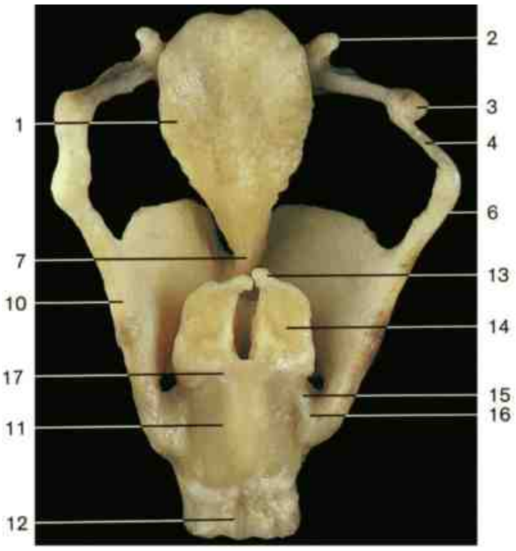
Organization of the neck (axial section at the level of the thyroid gland; schematic drawing).



Axial section of the neck at the level of the 4th cervical vertebra (MRI scan; from Heuck et al., MRT-Atlas, 2009).

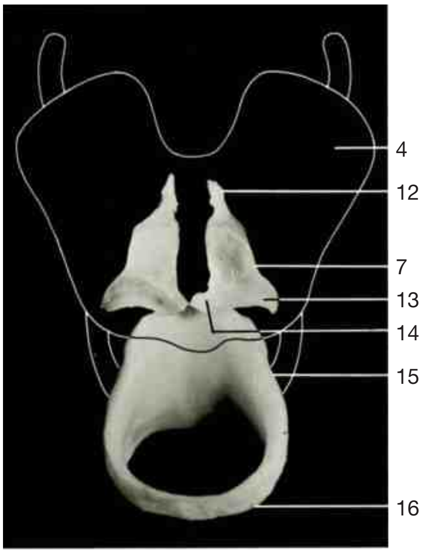


Cartilages of the larynx and the hyoid bone (anterior aspect).

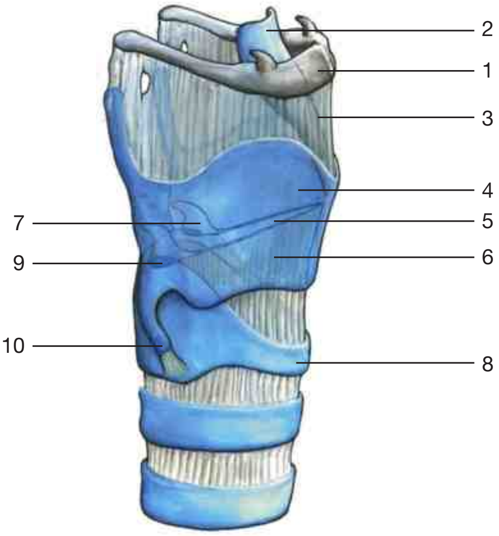


Cartilages of the larynx and the hyoid bone (posterior aspect).

1	Epiglottis
2	Lesser cornu of hyoid bone
3	Greater cornu of hyoid bone
4	Lateral thyrohyoid ligament
5	Body of hyoid bone
6	Superior cornu of thyroid cartilage
7	Thyro-epiglottic ligament
8	Conus elasticus
9	Cricothyroid ligament
10	Thyroid cartilage
11	Cricoid cartilage
12	Trachea
13	Corniculate cartilage
14	Arytenoid cartilage
15	Posterior crico-arytenoid ligament
16	Cricothyroid joint
17	Crico-arytenoid joint

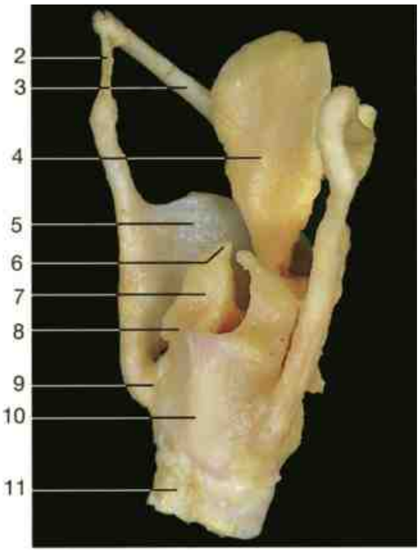


Cartilages of the larynx (anterior aspect). Thyroid cartilage is indicated by the outline.

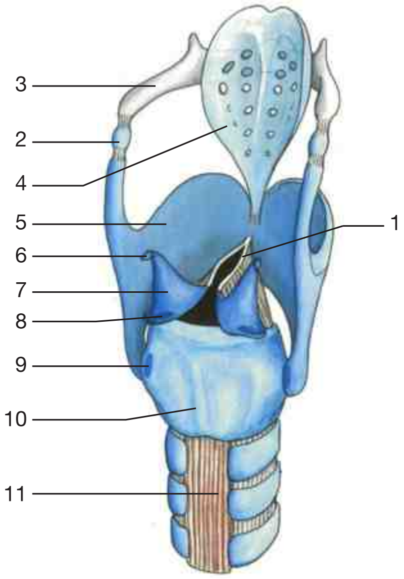


Cartilages and ligaments of the larynx (lateral aspect).

1	Hyoid bone
2	Epiglottis
3	Thyrohyoid membrane
4	Thyroid cartilage
5	Vocal ligament
6	Conus elasticus
7	Arytenoid cartilage
8	Cricoid cartilage
9	Crico-arytenoid joint
10	Cricothyroid joint
11	Tracheal cartilages
12	Corniculate cartilage
13	Muscular process of arytenoid cartilage
14	Vocal process of arytenoid cartilage
15	Lamina of cricoid cartilage
16	Arch of cricoid cartilage

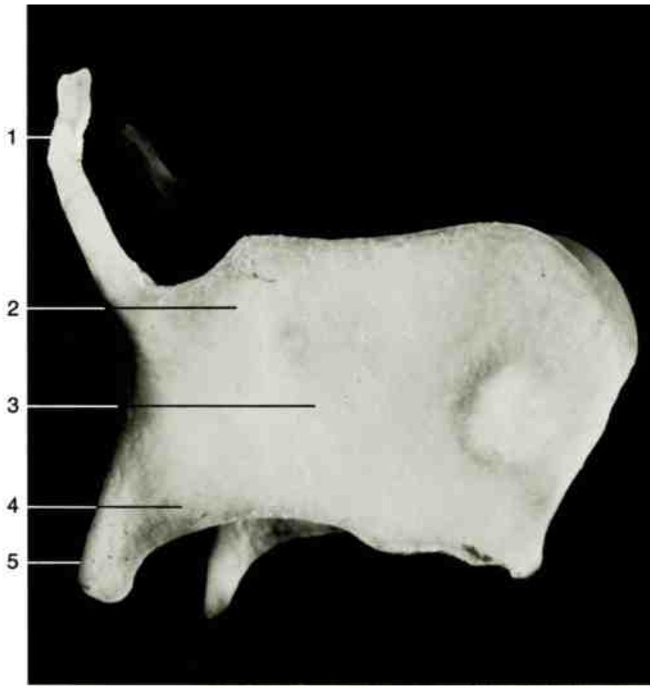


Cartilages of the larynx (oblique-posterior aspect).

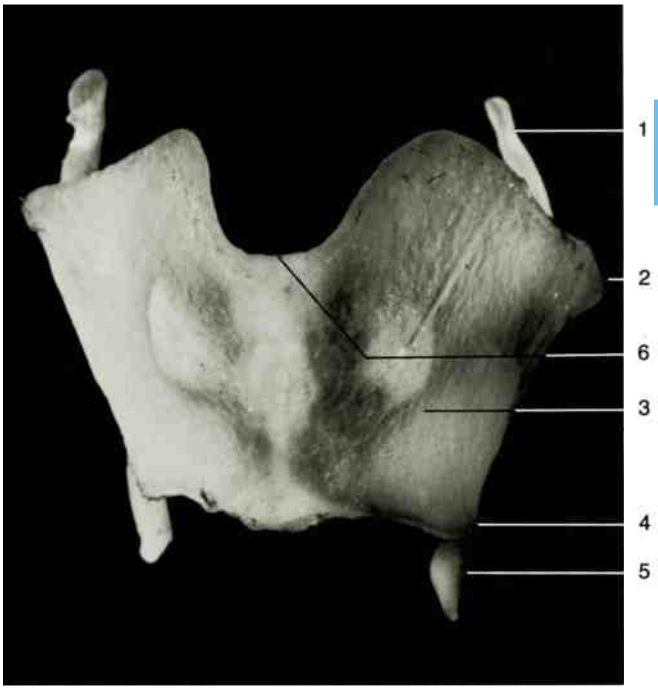


Cartilages of the larynx (oblique-posterior aspect).

1	Vocal ligament
2	Lateral thyrohyoid ligament
3	Greater cornu of hyoid bone
4	Epiglottis
5	Thyroid cartilage
6	Corniculate cartilage
7	Arytenoid cartilage
8	Crico-arytenoid joint
9	Cricothyroid joint
10	Cricoid cartilage
11	Trachea

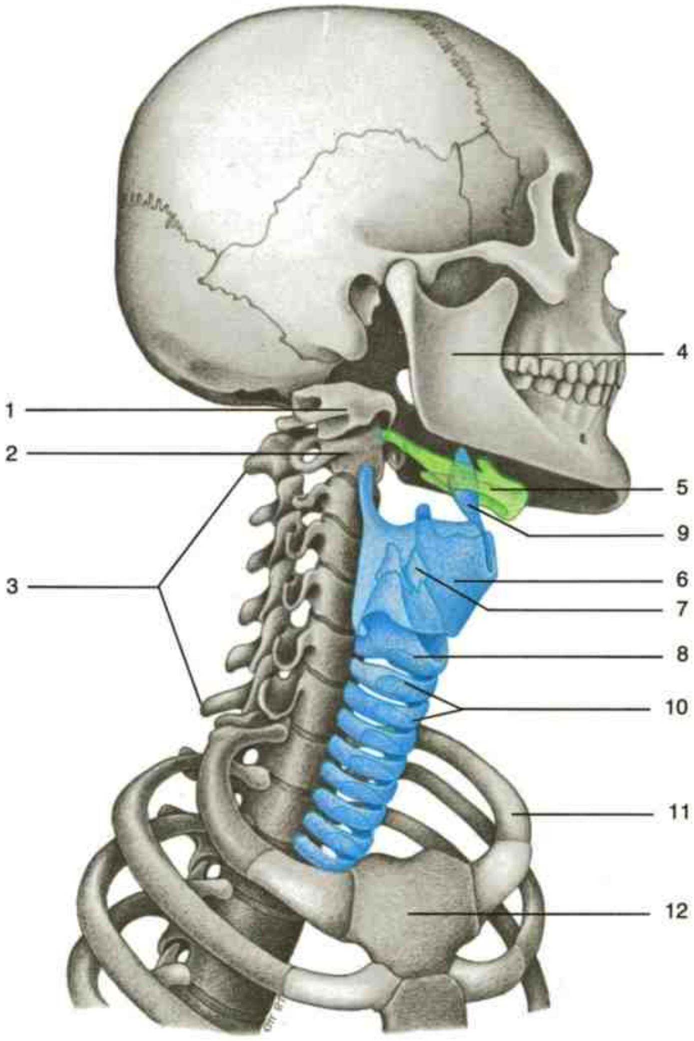


Thyroid cartilage (lateral aspect).



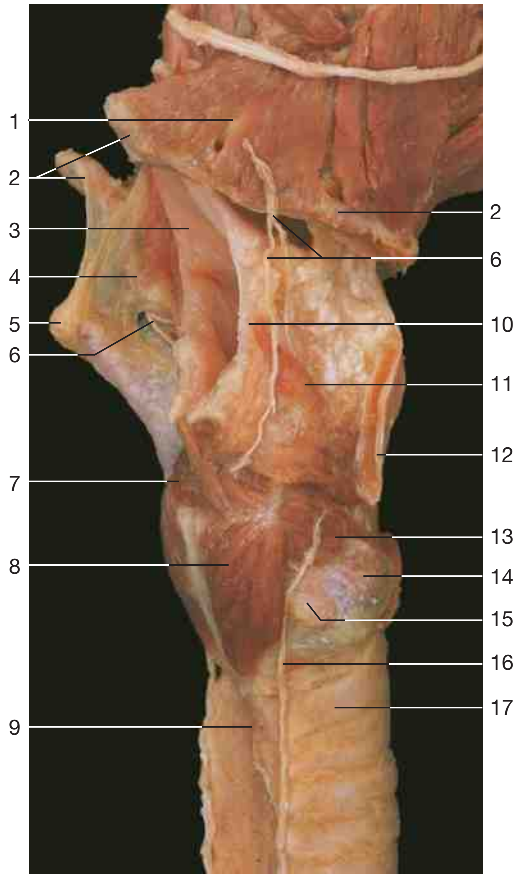
Thyroid cartilage (anterior aspect).

1 Superior cornu
2 Superior thyroid tubercle
3 Lamina of thyroid cartilage
4 Inferior thyroid tubercle
5 Inferior cornu
6 Superior thyroid notch



1 Atlas
2 Axis
3 Cervical vertebrae (C_2–C_7)
4 Mandible
5 Hyoid bone
6 Thyroid cartilage
7 Arytenoid cartilage
8 Cricoid cartilage
9 Epiglottis
10 Tracheal cartilages
11 First rib
12 Manubrium sterni

Position of the larynx in the neck (oblique-lateral aspect). (Schematic drawing.)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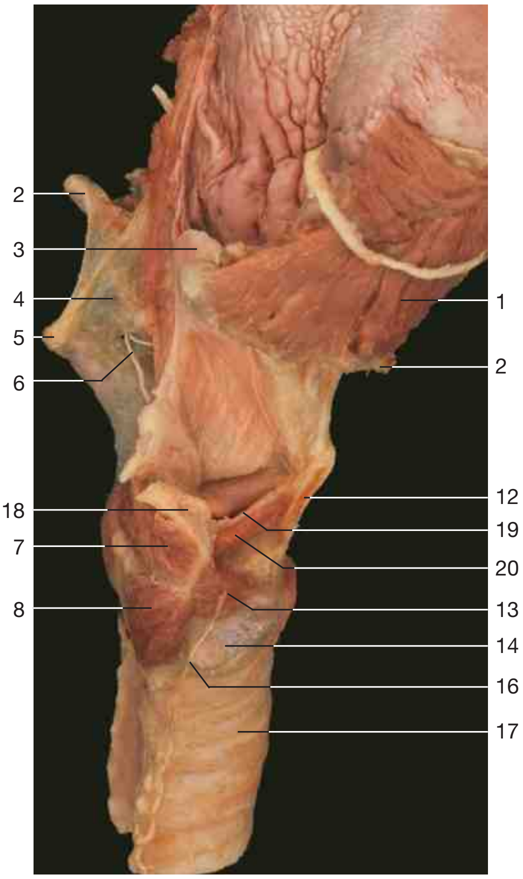
Laryngeal muscles (lateral aspect). Thyroid cartilage (12) and thyro-arytenoid muscle have been partly removed.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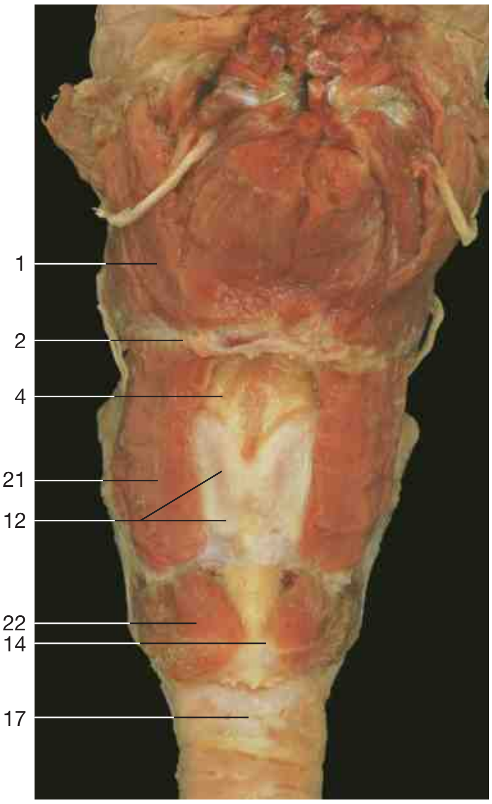
Laryngeal muscles (lateral aspect). Half of the thyroid cartilage (12) has been removed. Dissection of the vocal ligament (19).

1	Hyoglossus muscle
2	Hyoid bone
3	Epiglottis
4	Thyrohyoid membrane
5	Superior cornu of thyroid cartilage
6	Superior laryngeal nerve
7	Transverse arytenoid muscle
8	Posterior crico-arytenoid muscle
9	Transverse muscle of trachea
10	Ary-epiglottic fold
11	Thyro-epiglottic muscle
12	Thyroid cartilage
13	Lateral crico-arytenoid muscle
14	Cricoid cartilage
15	Articular facet for thyroid cartilage
16	Inferior laryngeal nerve (branch of recurrent nerve)
17	Trachea
18	Arytenoid cartilage
19	Vocal ligament
20	Vocalis muscle (part of thyro-arytenoid muscle)
21	Thyrohyoideus muscle
22	Cricothyroideus muscle
23	Root of tongue
24	Cuneiform tubercle
25	Corniculate tubercle
26	Ary-epiglottic muscle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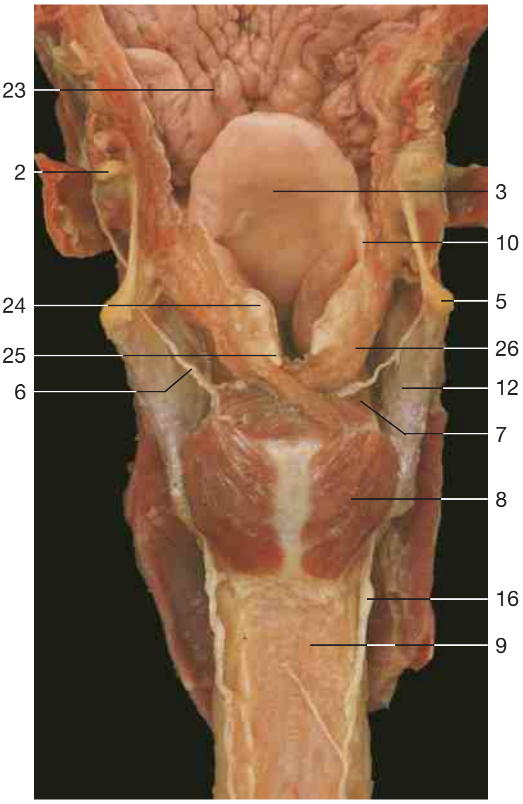
Laryngeal muscles and larynx (anterior aspect).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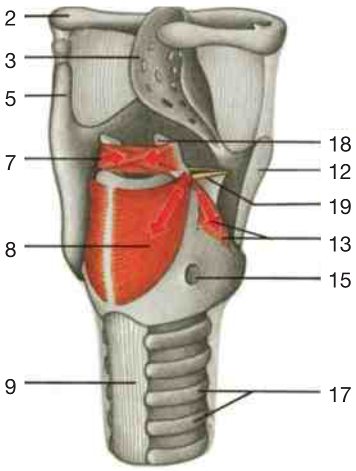
Laryngeal muscles and larynx (posterior aspect).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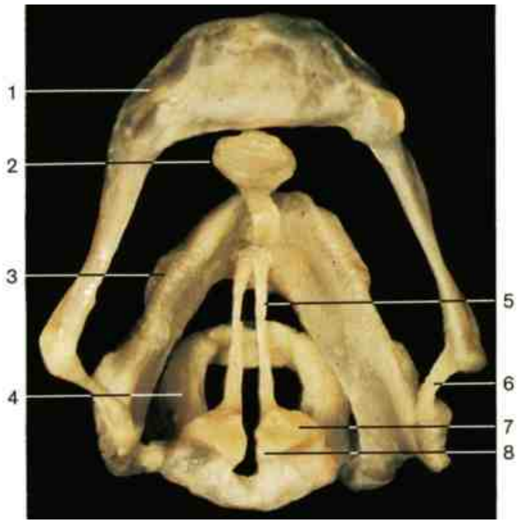
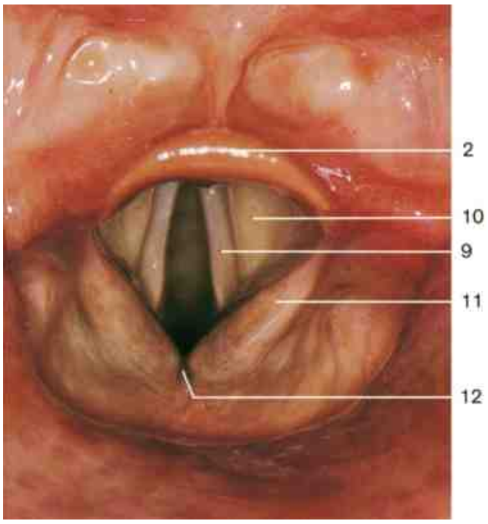
Action of internal muscles of the larynx (schematic drawing).

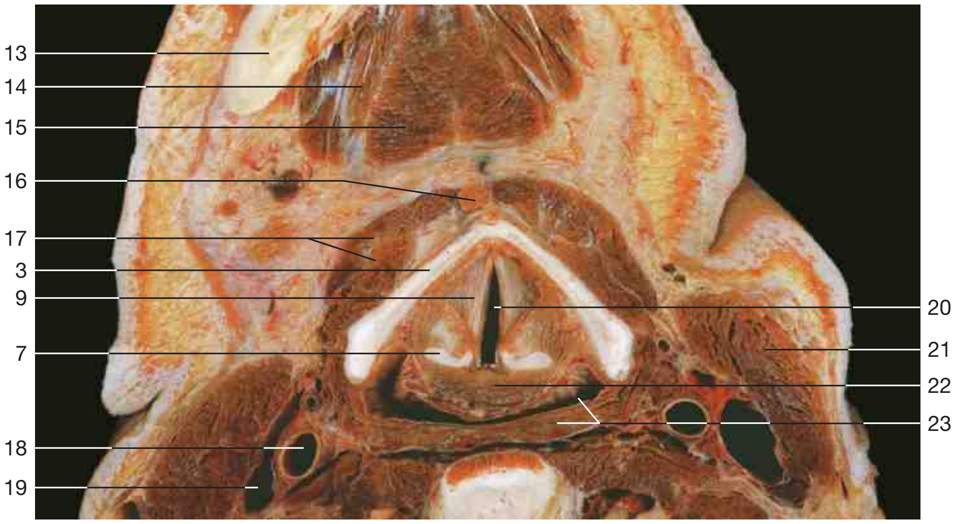
1	Hyoid bone
2	Epiglottis
3	Thyroid cartilage
4	Cricoid cartilage
5	Vocal ligament
6	Thyrohyoid ligament
7	Arytenoid cartilage
8	Corniculate cartilage
9	Vocal fold
10	Vestibular fold
11	Ary-epiglottic fold
12	Interarytenoid notch
13	Mandible
14	Anterior belly of digastric muscle
15	Mylohyoid muscle
16	Pyramidal lobe of thyroid gland
17	Sternohyoid and sternothyroid muscles
18	Common carotid artery
19	Internal jugular vein
20	Rima glottidis
21	Sternocleidomastoid muscle
22	Transverse arytenoid muscle
23	Pharynx and inferior constrictor muscle
24	Ventricle of larynx
25	Vocalis muscle
26	Trachea
27	Superior cornu of thyroid cartilage
28	Root of tongue (lingual tonsil)
29	Piriform recess
30	Vocalis muscle
31	Lateral crico-arytenoid muscle
32	Thyroid gland



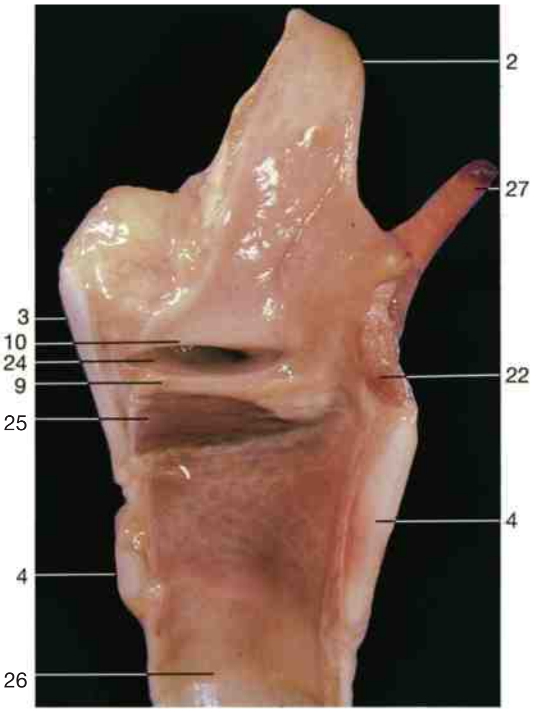
Laryngeal cartilages (superior aspect).



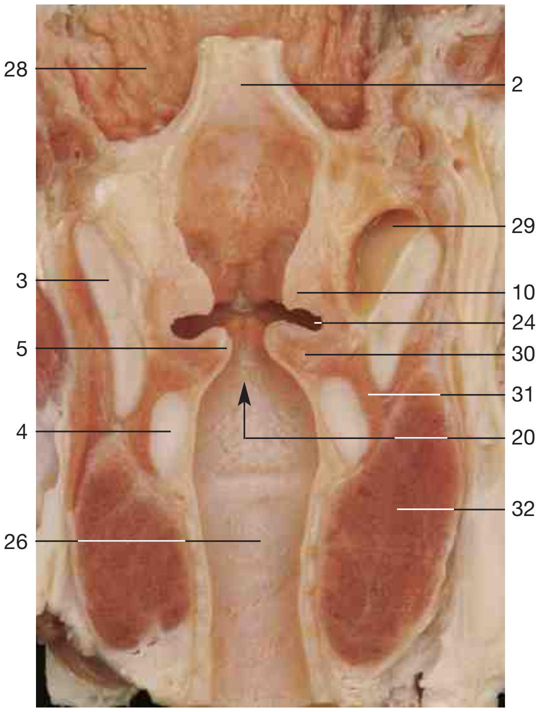
Glottis in vivo (superior aspect).



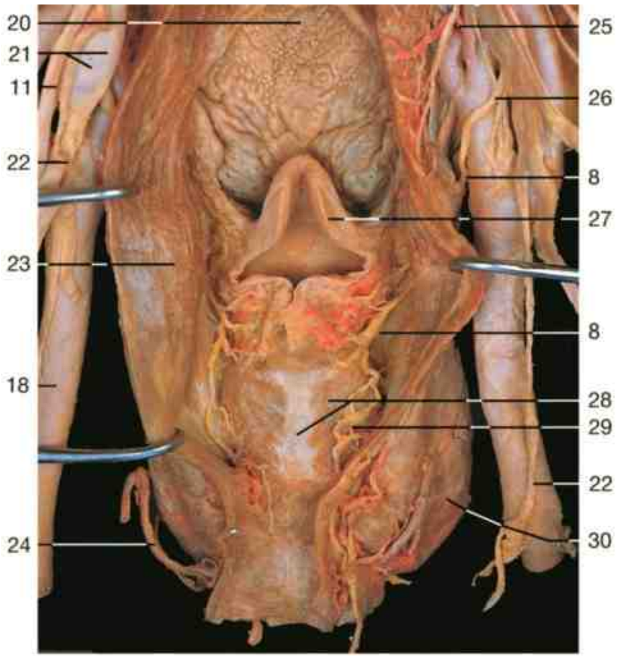
Horizontal section through the larynx at the level of the vocal folds (superior aspect).



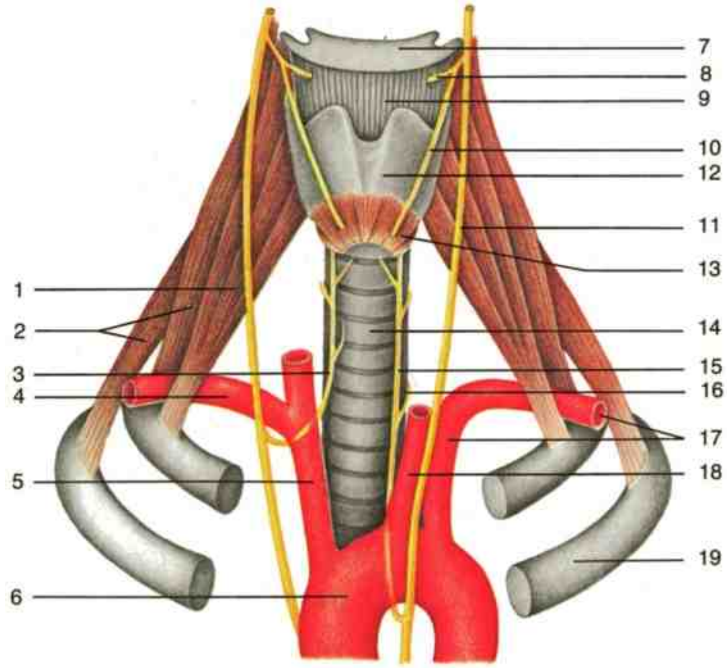
Sagittal section through the larynx.



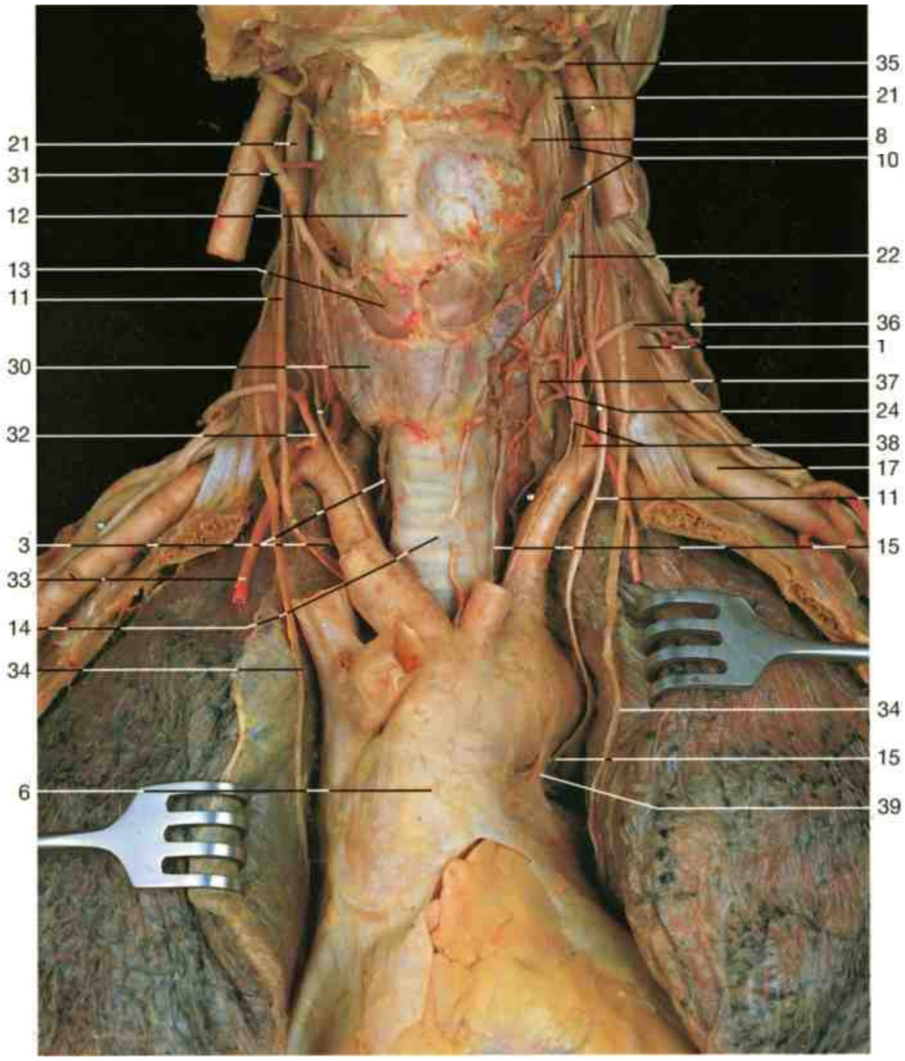
Coronal section through larynx and trachea.



Larynx and its innervation (posterior aspect). Dissection of superior and inferior laryngeal nerves. Pharynx has been opened.

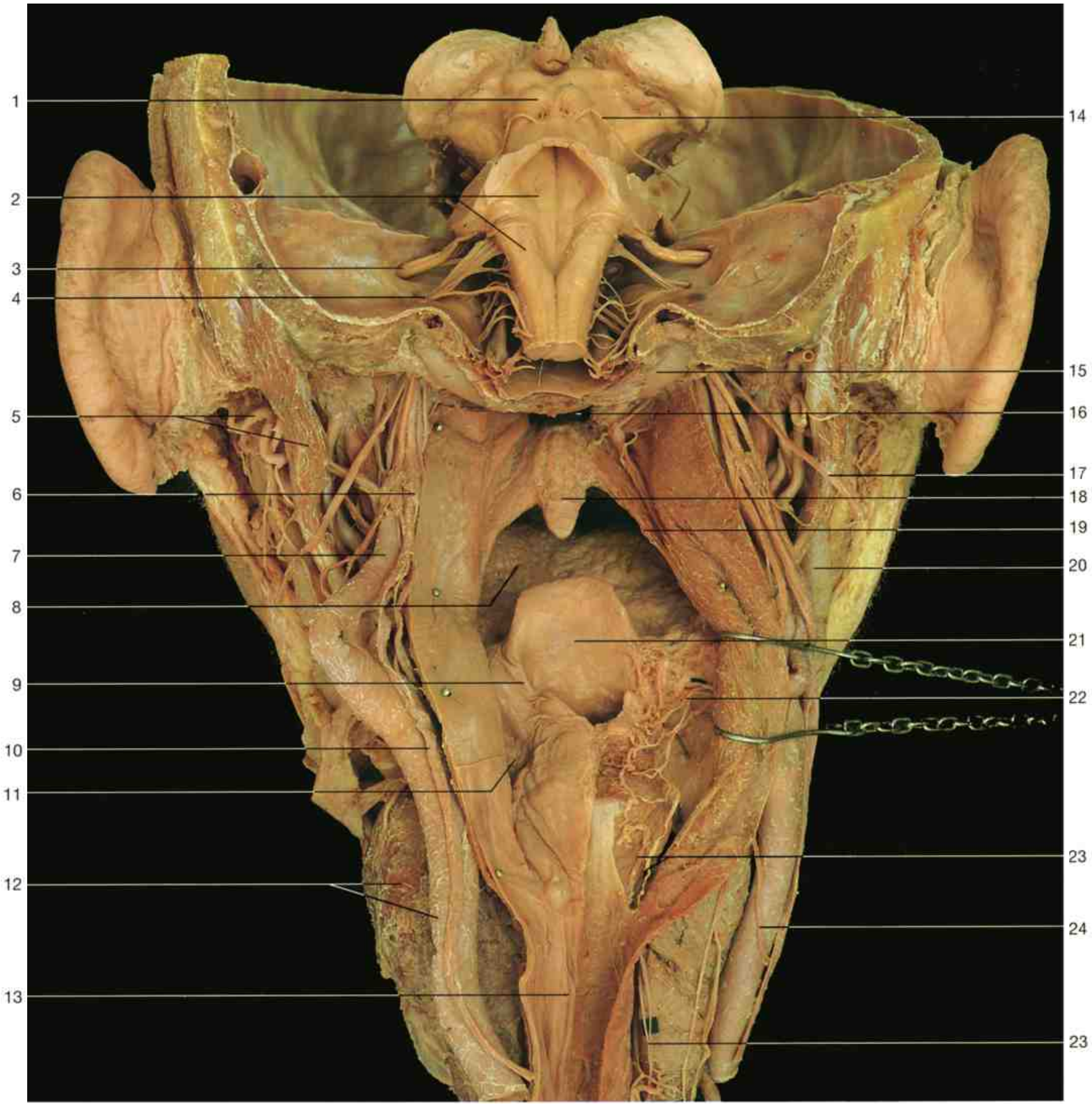


Innervation of the larynx (schematic drawing).



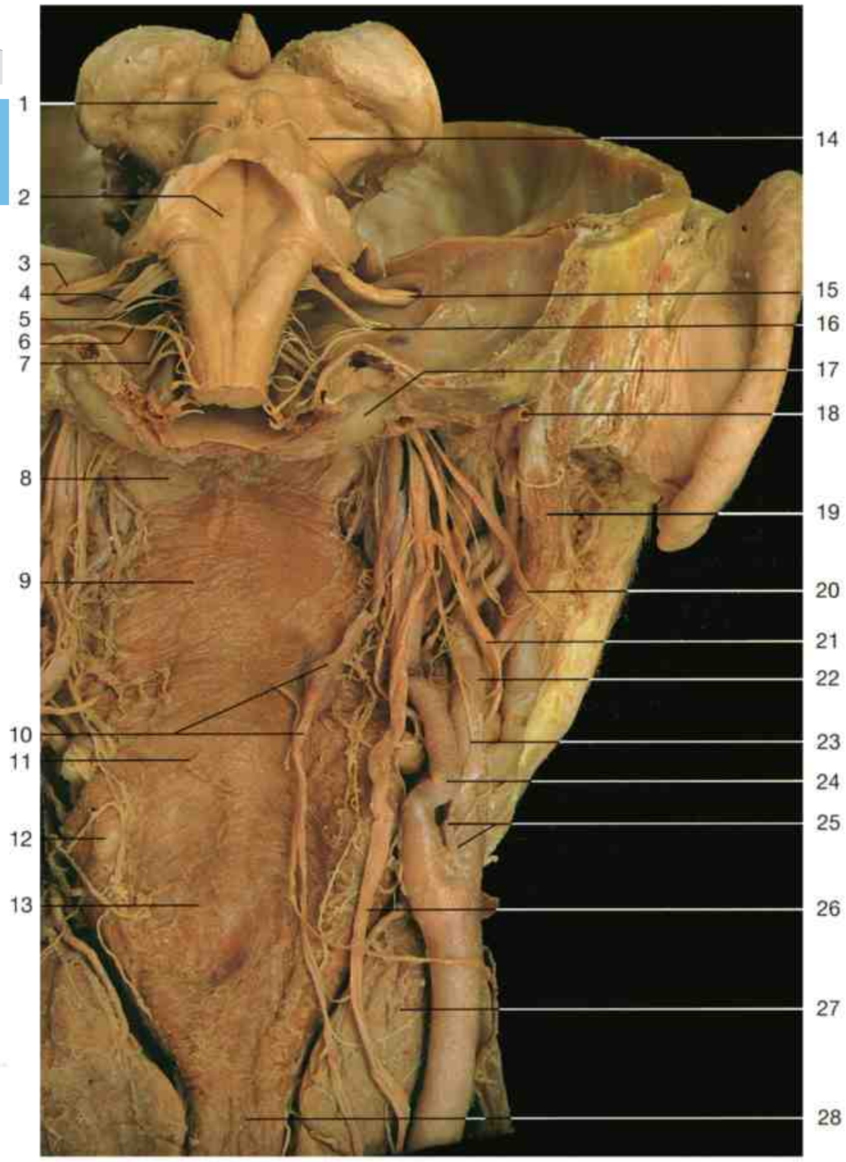
Larynx and thoracic organs (anterior aspect). Dissection of vagus and recurrent laryngeal nerves.

1	Scalenus anterior muscle
2	Scalenus medius and posterior muscles
3	Right recurrent laryngeal nerve
4	Right subclavian artery
5	Brachiocephalic trunk
6	Aortic arch
7	Hyoid bone
8	Internal branch of superior laryngeal nerve
9	Thyrohyoid membrane
10	External branch of superior laryngeal nerve
11	Vagus nerve
12	Thyroid cartilage
13	Cricothyroid muscle
14	Trachea
15	Left recurrent laryngeal nerve
16	Esophagus
17	Left subclavian artery
18	Left common carotid artery
19	Second rib
20	Tongue
21	Superior cervical ganglion
22	Sympathetic trunk
23	Inferior constrictor muscle of pharynx
24	Inferior thyroid artery
25	Glossopharyngeal nerve
26	Superior laryngeal nerve
27	Epiglottis
28	Posterior crico-arytenoid muscle and cricoid cartilage
29	Inferior laryngeal branch of recurrent laryngeal nerve
30	Thyroid gland
31	Superior thyroid artery
32	Thyrocervical trunk
33	Internal thoracic artery
34	Phrenic nerve
35	Hypoglossal nerve
36	Transverse cervical artery
37	Middle cervical ganglion
38	Middle cervical cardiac nerves (branches of sympathetic trunk)
39	Ligamentum arteriosum



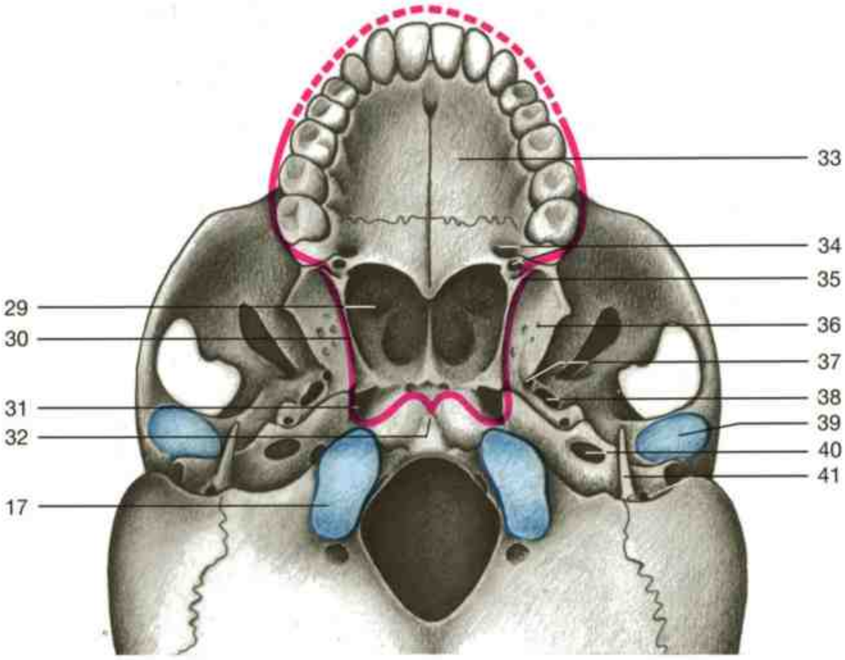
Larynx and oral cavity (posterior aspect). Mucous membrane on the right half of pharynx has been removed.

1 Midbrain (inferior colliculus)
2 Rhomboid fossa and medulla oblongata
3 Vestibulocochlear and facial nerve
4 Glossopharyngeal, vagus, and accessory nerves
5 Occipital artery and posterior belly of digastric muscle
6 Superior cervical ganglion
7 Internal carotid artery
8 Oral cavity (tongue)
9 Ary-epiglottic fold
10 Vagus nerve
11 Piriform recess
12 Thyroid gland and common carotid artery
13 Esophagus
14 Trochlear nerve
15 Occipital condyle
16 Nasal cavity (choana)
17 Accessory nerve
18 Uvula and soft palate
19 Palatopharyngeus muscle
20 External carotid artery
21 Epiglottis
22 Internal branch of superior laryngeal nerve
23 Inferior laryngeal nerve
24 Ansa cervicalis

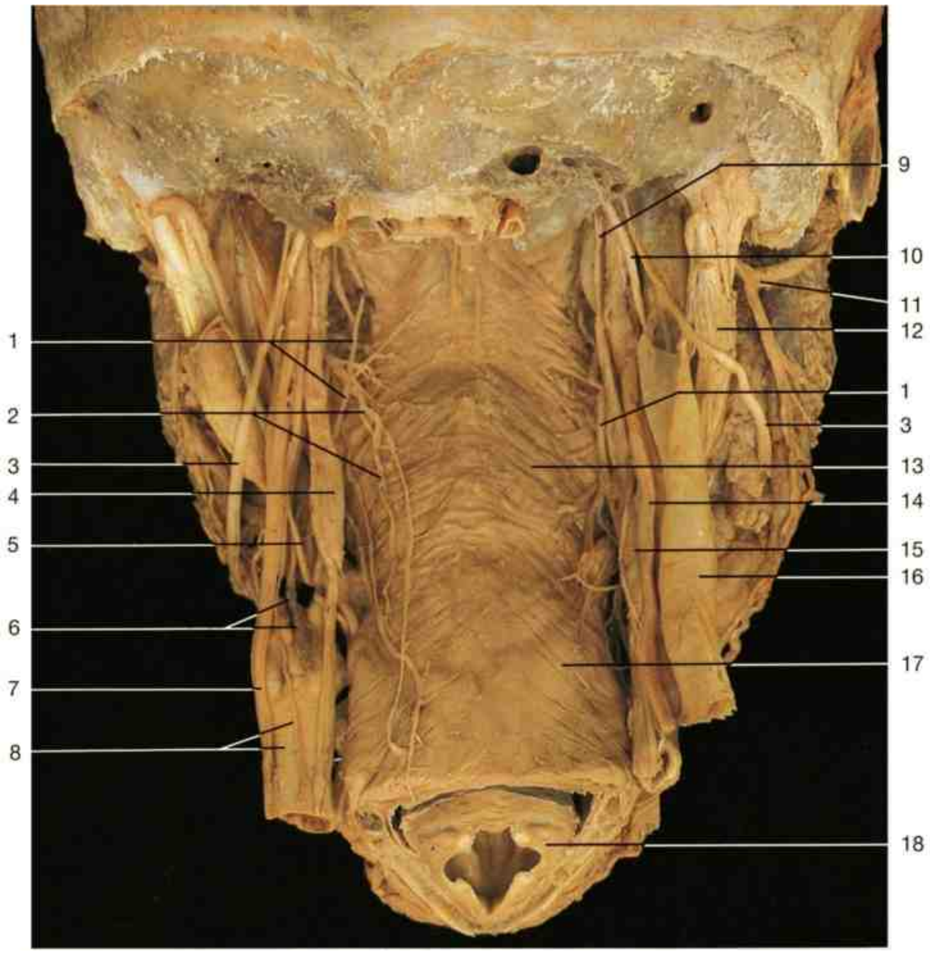


Pharynx and parapharyngeal nerves in connection with brain stem (posterior aspect).

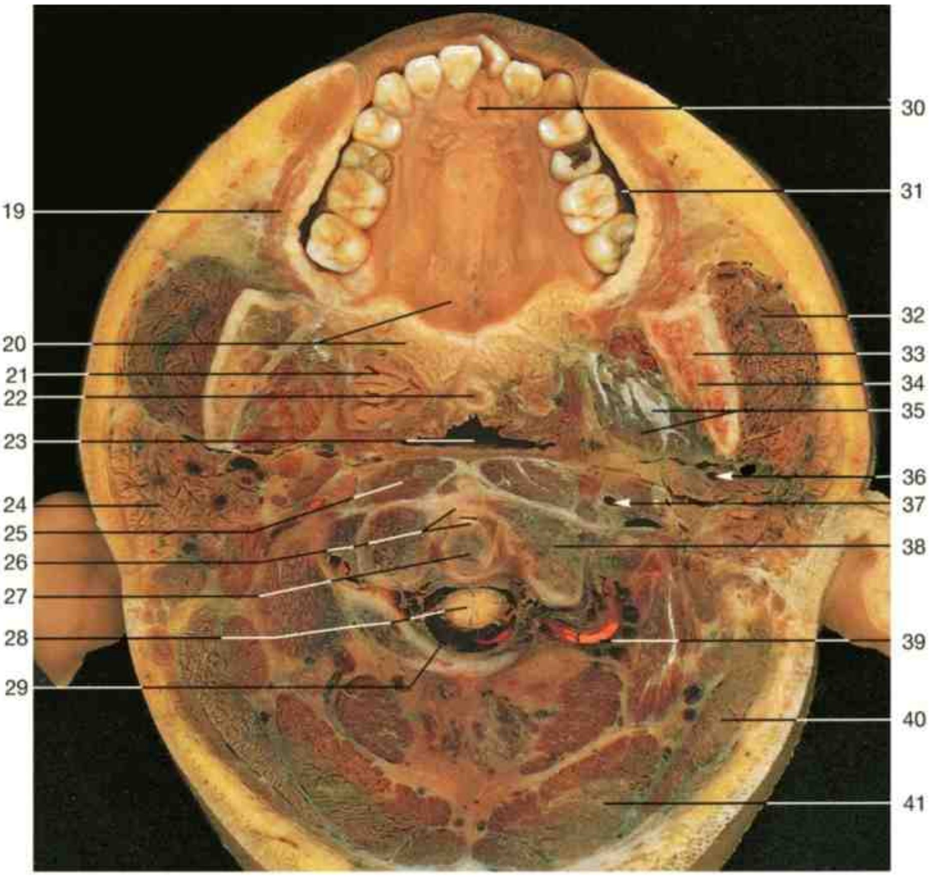
1 Inferior colliculus of midbrain
2 Facial colliculus in floor of rhomboid fossa
3 Vestibulocochlear and facial nerves
4 Glossopharyngeal nerve
5 Vagus nerve
6 Accessory nerve
7 Hypoglossal nerve
8 Pharyngobasilar fascia
9 Superior constrictor muscle of pharynx
10 Sympathetic trunk and superior cervical ganglion (medially displaced)
11 Middle constrictor muscle of pharynx
12 Greater cornu of hyoid bone
13 Inferior constrictor muscle of pharynx
14 Trochlear nerve
15 Internal acoustic meatus with facial and vestibulocochlear nerves
16 Jugular foramen with glossopharyngeal, vagus, and assessory nerves
17 Occipital condyle
18 Occipital artery
19 Posterior belly of digastric muscle
20 Accessory nerve (extracranial part)
21 Hypoglossal nerve (extracranial part)
22 External carotid artery
23 Carotid sinus nerve
24 Internal carotid artery
25 Carotid sinus and carotid body
26 Vagus nerve
27 Thyroid gland
28 Esophagus
29 Choanae
30 Medial pterygoid plate
31 Foramen lacerum
32 Pharyngeal tubercle
33 Hard palate
34 Greater and lesser palatine foramen
35 Pterygoid hamulus
36 Lateral pterygoid plate
37 Pterygoid canal
38 Foramen ovale
39 Mandibular fossa
40 Carotid canal
41 Styloid process and stylomastoid foramen



Inferior aspect of the skull.
Red line = outline of superior constrictor muscle in continuation with buccinator muscle and orbicularis oris muscle (semischematic drawing).

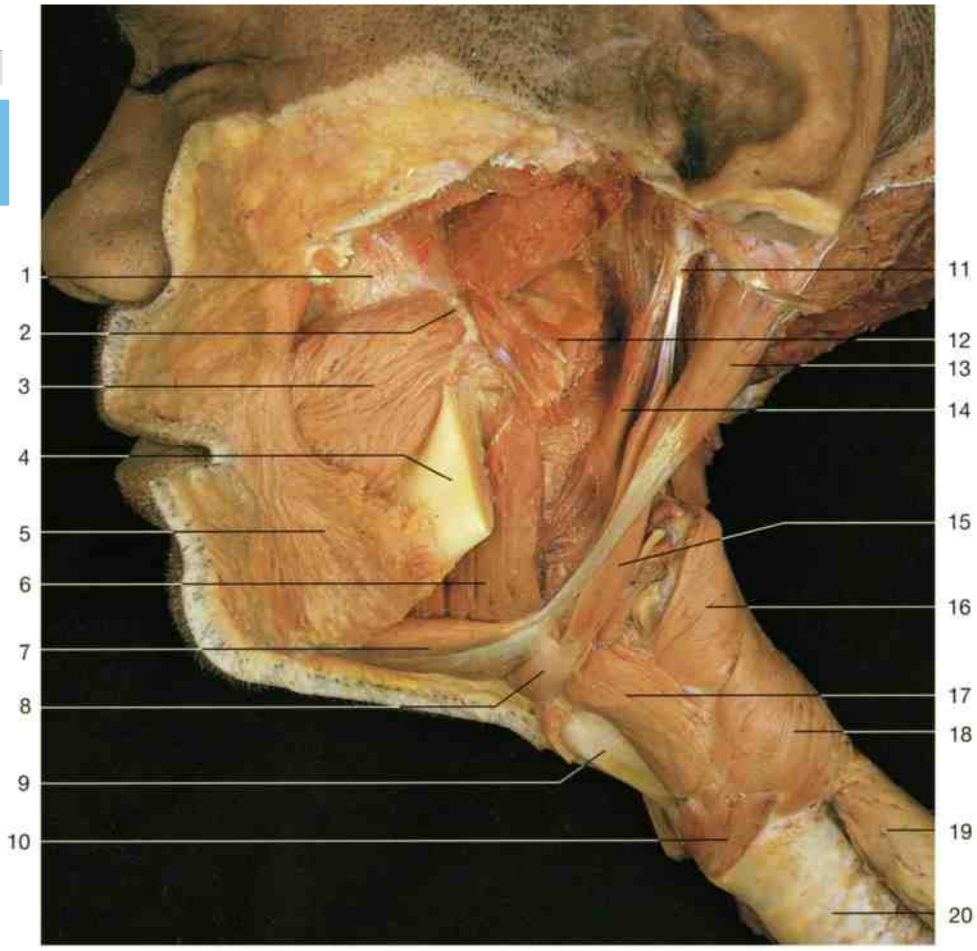


Parapharyngeal nerves and vessels. Dorsal aspect of the pharynx.

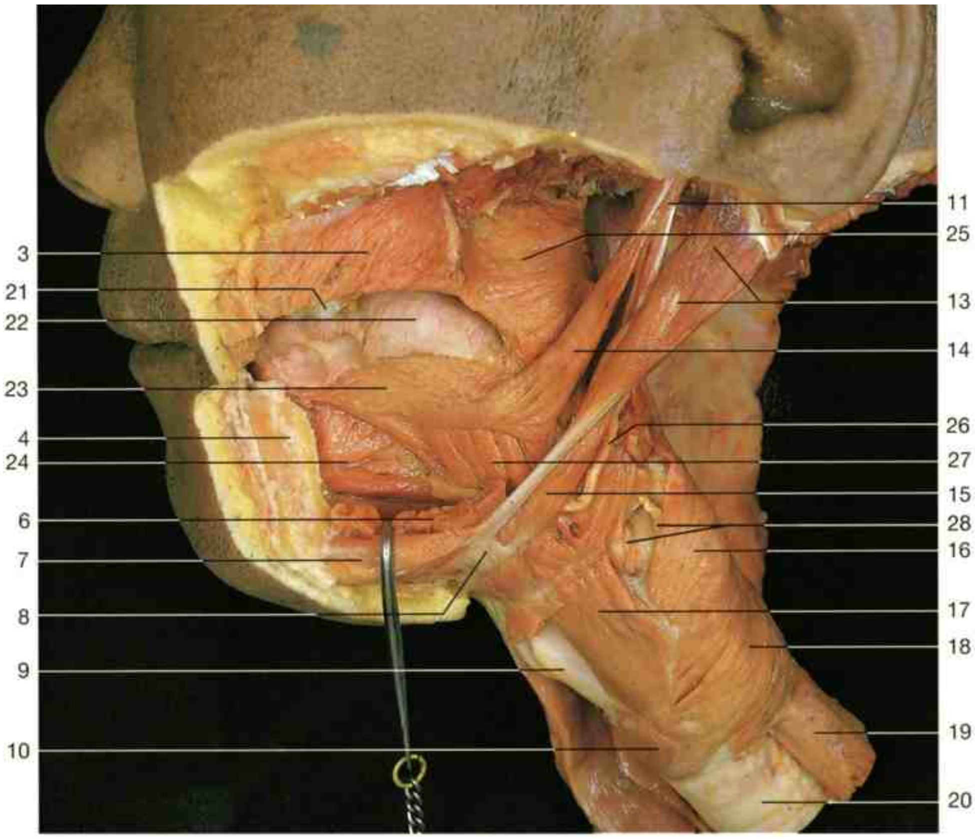


Cross section of head and neck at the level of the atlas (inferior aspect).

1 Ascending pharyngeal artery
2 Pharyngeal plexus
3 Accessory nerve
4 Superior cervical ganglion of sympathetic trunk
5 Superior laryngeal nerve
6 Carotid body and carotid sinus nerve
7 Left vagus nerve
8 Common carotid artery and cardiac branch of vagus nerve
9 Glossopharyngeal nerve
10 Hypoglossal nerve
11 Facial nerve
12 Posterior belly of digastric muscle
13 Middle constrictor muscle of pharynx
14 Right vagus nerve
15 Sympathetic trunk
16 Internal jugular vein
17 Inferior constrictor muscle of pharynx
18 Larynx
19 Buccinator muscle
20 Soft palate and palatine glands
21 Palatine tonsil
22 Uvula of palate
23 Pharynx (oral part)
24 Parotid gland
25 Longus capitis muscle
26 Median atlanto-axial joint and anterior arch of atlas
27 Dens of axis
28 Spinal cord
29 Dura mater
30 Incisive papilla
31 Oral vestibule
32 Masseter muscle
33 Mandible
34 Mandibular canal with vessels and nerve
35 Medial pterygoid muscle
36 External carotid artery
37 Internal carotid artery
38 Atlas
39 Vertebral artery
40 Splenius capitis muscle
41 Semispinalis capitis muscle

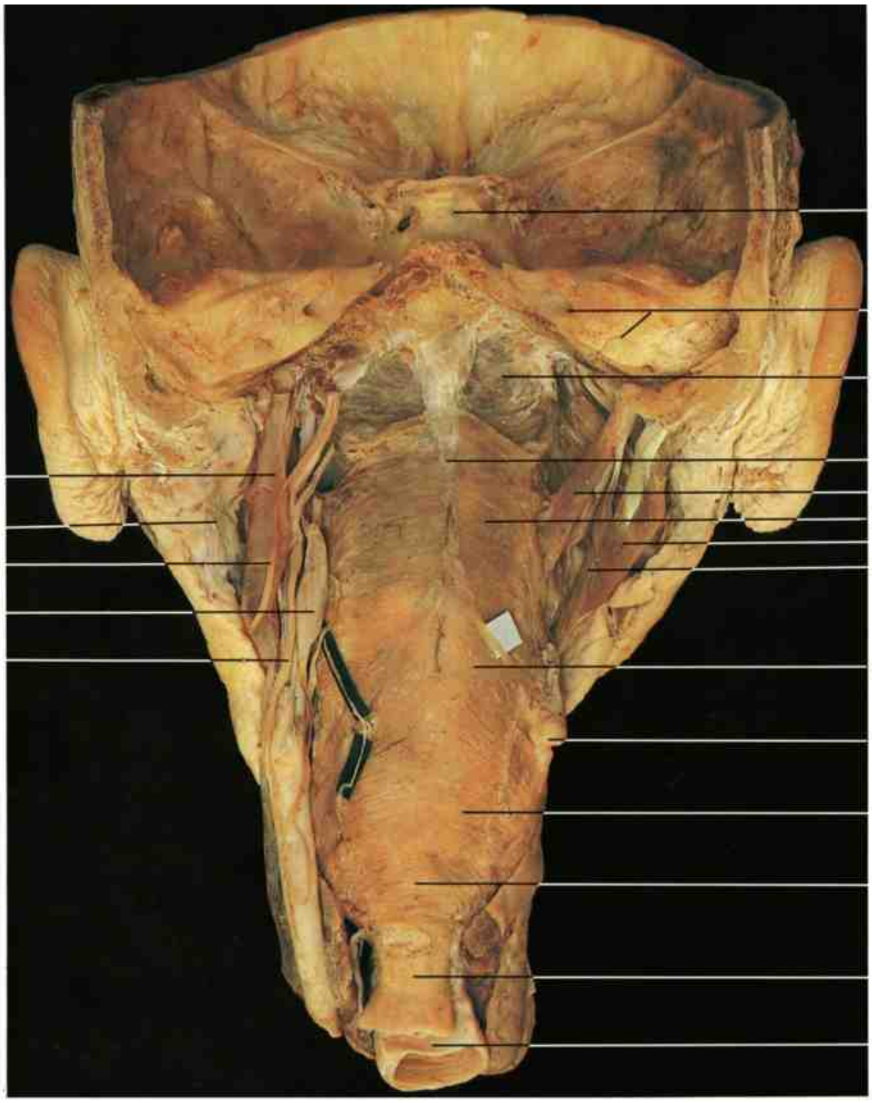


Dissection of pharynx, supra-, and infrahyoid muscles. Mandible partly removed (lateral aspect).



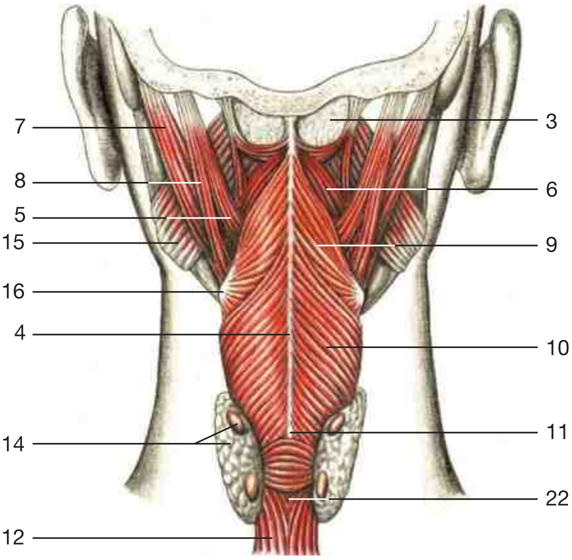
Dissection of pharynx, supra-, and infrahyoid muscles. Oral cavity opened (lateral aspect).

1	Maxilla
2	Pterygomandibular raphe
3	Buccinator muscle
4	Mandible (divided)
5	Depressor anguli oris muscle
6	Mylohyoid muscle
7	Anterior belly of digastric muscle
8	Hyoid bone
9	Thyroid cartilage
10	Cricothyroid muscle
11	Styloid process
12	Medial pterygoid muscle (divided)
13	Posterior belly of digastric muscle
14	Styloglossus muscle
15	Stylohyoid muscle
16	Thyropharyngeal part of inferior constrictor muscle of pharynx
17	Thyrohyoid muscle
18	Cricopharyngeal part of inferior constrictor muscle of pharynx
19	Esophagus
20	Trachea
21	First molar of maxilla
22	Tongue
23	Inferior longitudinal muscle of tongue
24	Genioglossus muscle
25	Superior constrictor muscle of pharynx
26	Hypoglossal nerve
27	Hyoglossus muscle
28	Superior laryngeal nerve and superior laryngeal artery

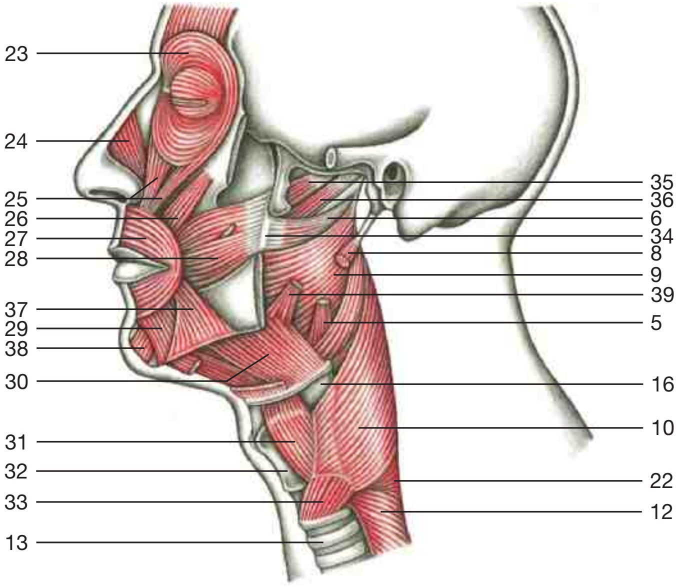


Muscles of the pharynx (posterior aspect).

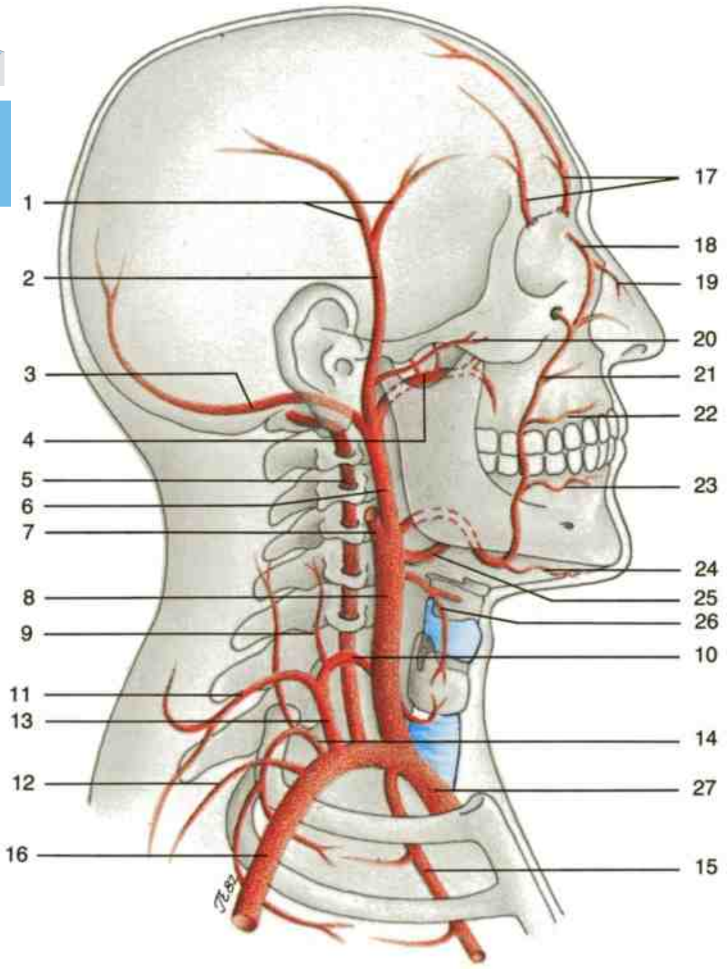
1 Sella turcica
2 Internal acoustic meatus and petrous part of temporal bone
3 Pharyngobasilar fascia
4 Fibrous raphe of pharynx
5 Stylopharyngeal muscle
6 Superior constrictor muscle of pharynx
7 Posterior belly of digastric muscle
8 Stylohyoid muscle
9 Middle constrictor muscle of pharynx
10 Inferior constrictor muscle of pharynx
11 Muscle-free area (Killian's triangle)
12 Esophagus
13 Trachea
14 Thyroid and parathyroid glands
15 Medial pterygoid muscle
16 Greater horn of hyoid bone
17 Internal jugular vein
18 Parotid gland
19 Accessory nerve
20 Superior cervical ganglion of sympathetic trunk
21 Vagus nerve
22 Laimer's triangle (area prone to developing diverticula)
23 Orbicularis oculi muscle
24 Nasalis muscle
25 Levator labii superioris and levator labii alaeque nasi muscles
26 Levator anguli oris muscle
27 Orbicularis oris muscle
28 Buccinator muscle
29 Depressor labii inferioris muscle
30 Hyoglossus muscle
31 Thyrohyoid muscle
32 Thyroid cartilage
33 Cricothyroid muscle
34 Pterygomandibular raphe
35 Tensor veli palatini muscle
36 Levator veli palatini muscle
37 Depressor anguli oris muscle
38 Mentalis muscle
39 Styloglossus muscle



Muscles of the pharynx (posterior aspect). (Schematic drawing.)



Muscles of the pharynx (lateral aspect). (Schematic drawing.)

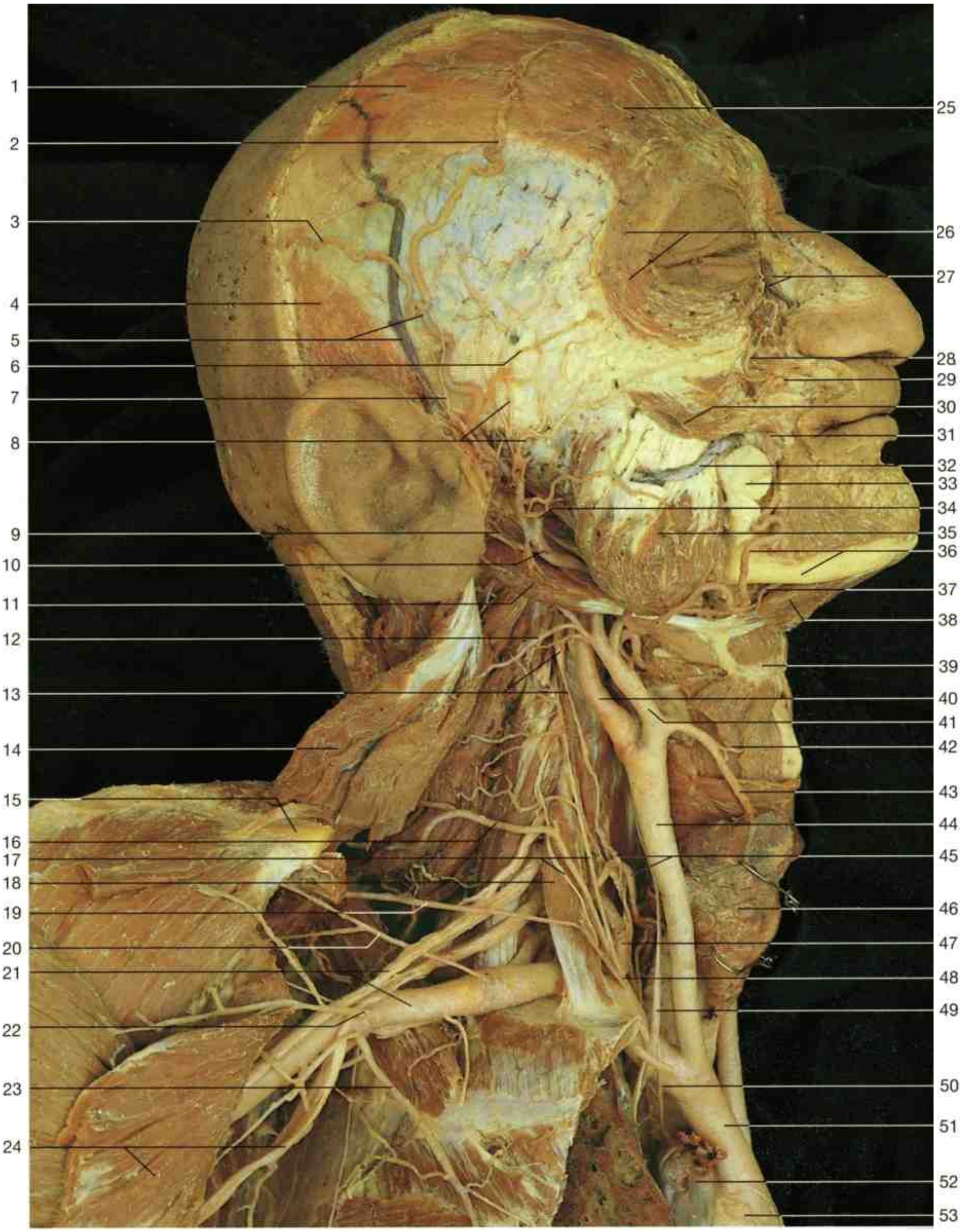


1 Frontal and parietal branches of superficial temporal artery
2 Superficial temporal artery
3 Occipital artery
4 Maxillary artery
5 Vertebral artery
6 External carotid artery
7 Internal carotid artery
8 Common carotid artery (divided)
9 Ascending cervical artery
10 Inferior thyroid artery
11 Transverse cervical artery with two branches (superficial cervical artery and descending scapular artery)
12 Suprascapular artery
13 Thyrocervical trunk
14 Costocervical trunk with two branches (deep cervical artery and superior intercostal artery)
15 Internal thoracic artery
16 Axillary artery
17 Supra-orbital and supratrochlear arteries
18 Angular artery
19 Dorsal nasal artery
20 Transverse facial artery
21 Facial artery
22 Superior labial artery
23 Inferior labial artery
24 Submental artery
25 Lingual artery
26 Superior thyroid artery
27 Brachiocephalic trunk

Arteries of head and neck. Diagram of the main branches of external carotid and subclavian arteries.

▷ **To page 169:**

1 Galea aponeurotica
2 Frontal branch } of superficial
3 Parietal branch } temporal artery
4 Superior auricular muscle
5 Superficial temporal artery and vein
6 Middle temporal artery
7 Auriculotemporal nerve
8 Branches of facial nerve
9 Facial nerve
10 External carotid artery within the retromandibular fossa
11 Posterior belly of digastric muscle
12 Sternocleidomastoid artery
13 Sympathetic trunk and superior cervical ganglion
14 Sternocleidomastoid muscle (divided and reflected)
15 Clavicle (divided)
16 Transverse cervical artery
17 Ascending cervical artery and phrenic nerve
18 Scalenus anterior muscle
19 Suprascapular artery
20 Dorsal scapular artery
21 Brachial plexus and axillary artery
22 Thoraco-acromial artery
23 Lateral thoracic artery
24 Median nerve (displaced) and pectoralis minor muscle (reflected)
25 Frontal belly of occipitofrontalis muscle
26 Orbital part of orbicularis oculi muscle
27 Angular artery and vein
28 Facial artery
29 Superior labial artery
30 Zygomaticus major muscle
31 Inferior labial artery
32 Parotid duct
33 Buccal fat pad
34 Maxillary artery
35 Masseter muscle
36 Facial artery and mandible
37 Submental artery
38 Anterior belly of digastric muscle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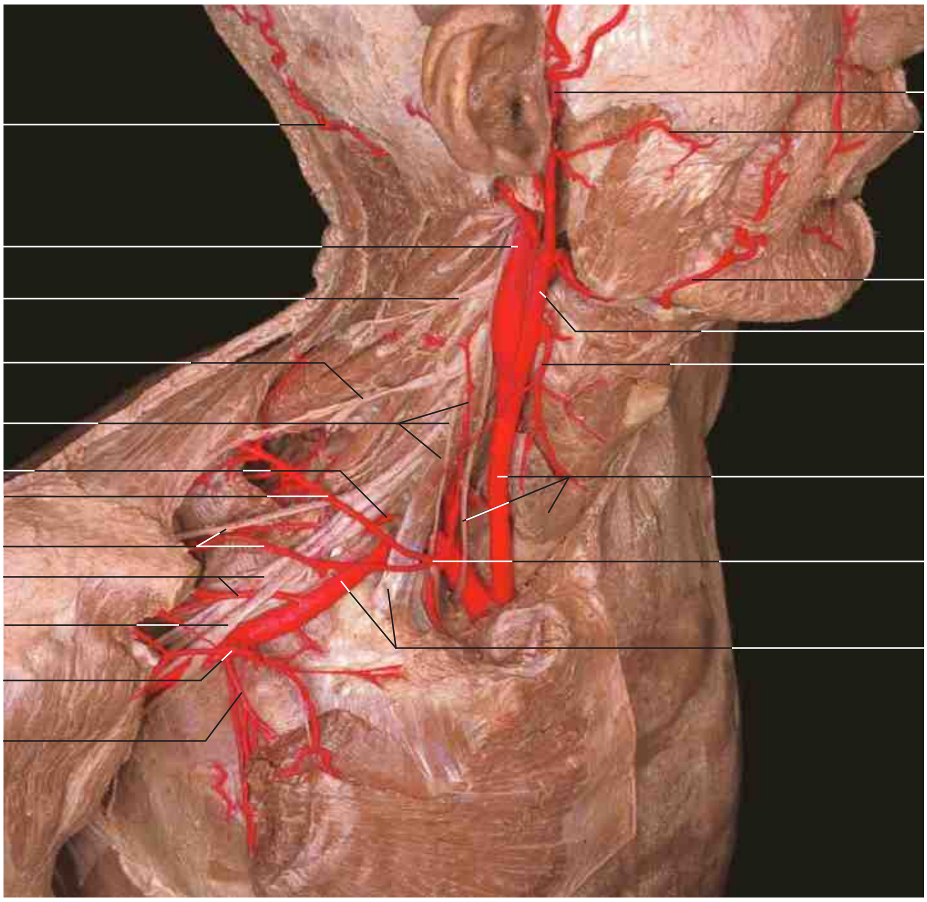
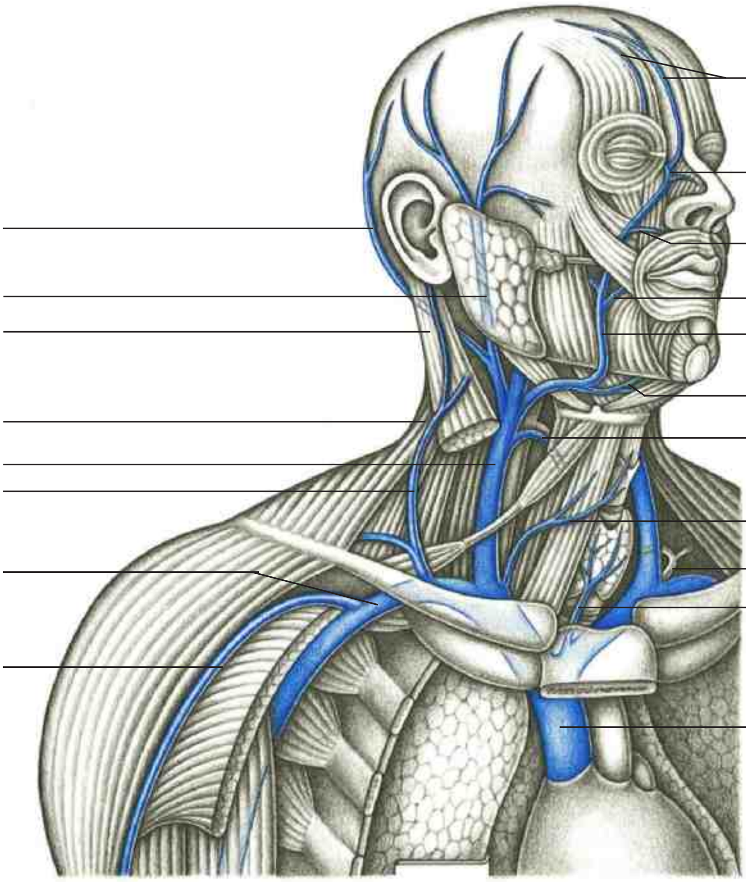
Main branches of head and neck arteries (lateral aspect). Anterior thoracic wall and clavicle partly removed; pectoralis muscles have been reflected to display the subclavian and axillary arteries.

39 Hyoid bone
40 Internal carotid artery
41 External carotid artery
42 Superior laryngeal artery
43 Superior thyroid artery
44 Common carotid artery
45 Thyroid ansa of sympathetic trunk and inferior thyroid artery

46 Thyroid gland (right lobe)
47 Vertebral artery
48 Thyrocervical trunk
49 Vagus nerve
50 Ansa subclavia of sympathetic trunk
51 Brachiocephalic trunk
52 Superior vena cava (divided)
53 Aortic arch

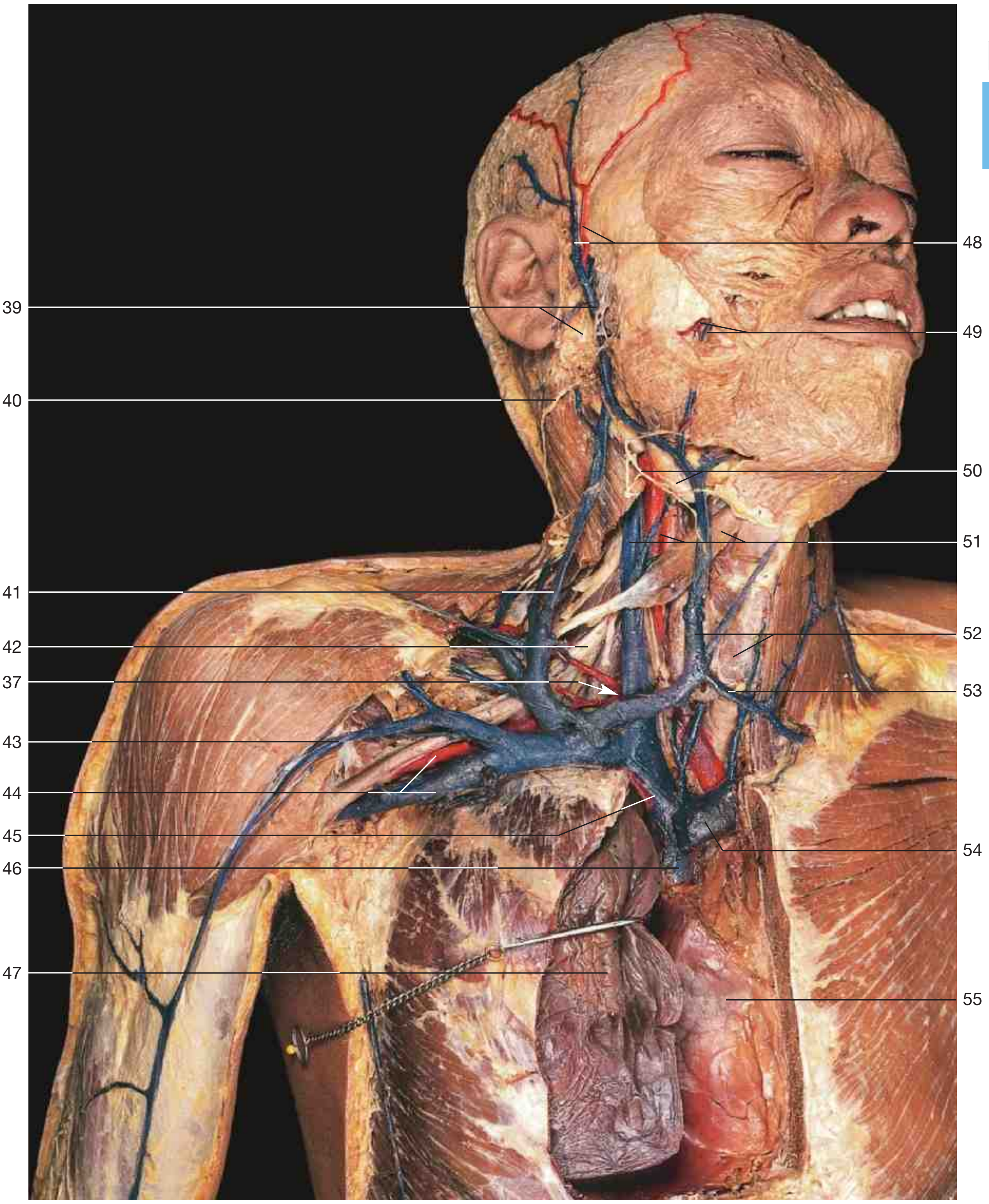


Arteries of head and neck (antero-lateral aspect). Clavicle, sternocleidomastoid muscle, and veins have been partly removed; the arteries have been colored.



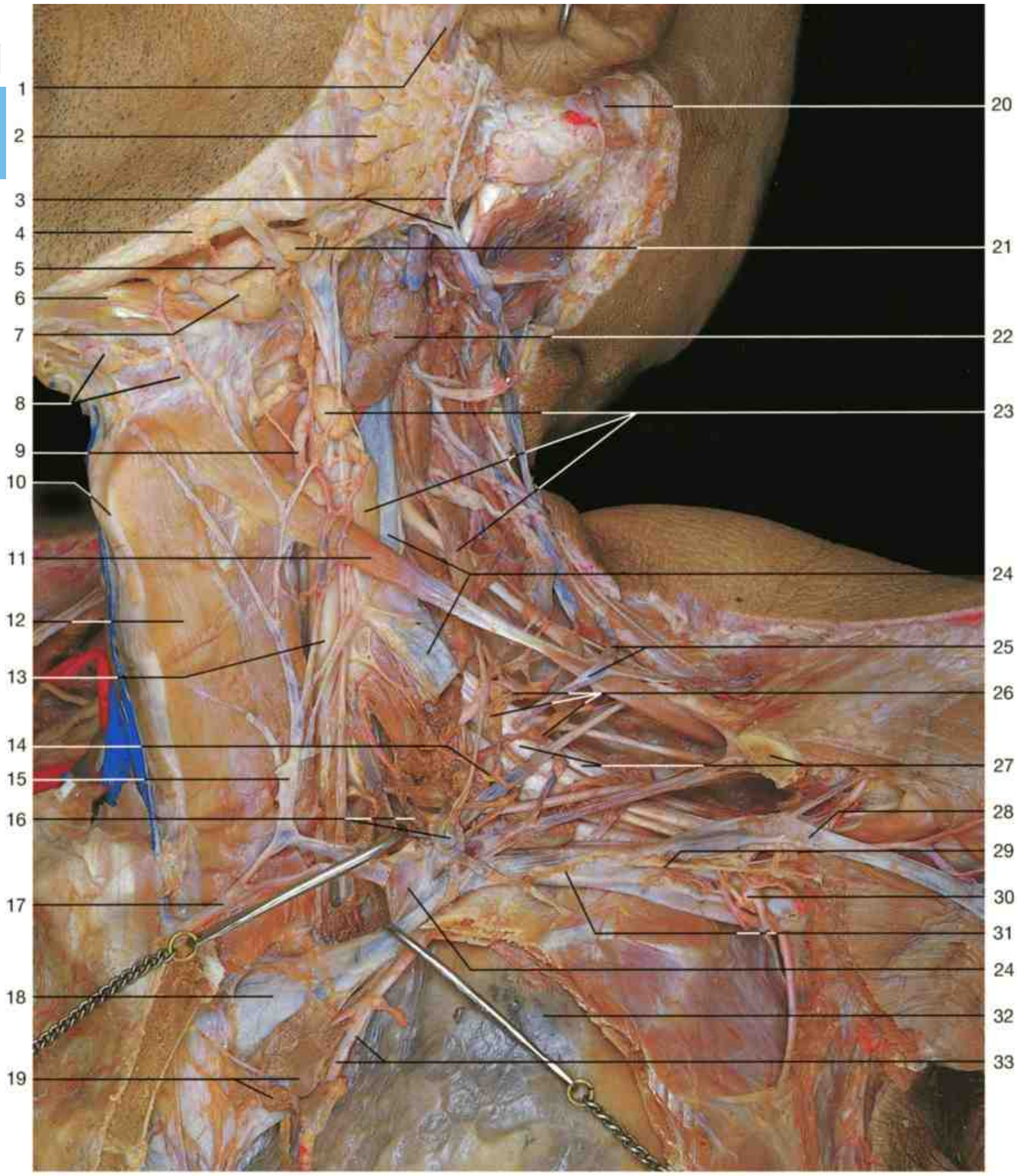
Veins of head and neck. Sternocleidomastoid muscle and anterior thoracic wall partly removed. Note the venous connection with the superior vena cava.

1	Occipital vein
2	Superficial temporal vein
3	Sternocleidomastoid muscle
4	Trapezius muscle
5	Internal jugular vein
6	External jugular vein
7	Subclavian vein
8	Cephalic vein
9	Supra-orbital veins
10	Angular vein
11	Superior labial vein
12	Inferior labial vein
13	Facial vein
14	Submental vein
15	Superior thyroid vein
16	Anterior jugular vein
17	Thoracic duct
18	Inferior thyroid vein
19	Superior vena cava
20	Occipital branch of occipital artery
21	Internal carotid artery
22	Cervical plexus
23	Supraclavicular nerve
24	Phrenic nerve and ascending cervical artery on scalenus anterior muscle
25	Superficial cervical artery
26	Suprascapular artery and nerve
27	Brachial plexus and anterior circumflex humeral artery
28	Lateral cord of brachial plexus
29	Thoraco-acromial artery
30	Lateral thoracic artery
31	Superficial temporal artery
32	Transverse facial artery
33	Facial artery
34	External carotid artery
35	Superior thyroid artery
36	Common carotid artery, vagus nerve, and thyroid gland
37	Thyrocervical trunk
38	Subclavian artery and scalenus anterior muscle
39	Parotid gland and facial nerve
40	Great auricular nerve
41	External jugular vein
42	Brachial plexus
43	Cephalic vein in deltopectoral groove
44	Axillary vein and artery
45	Right brachiocephalic vein
46	Superior vena cava
47	Right lung (reflected)
48	Superficial temporal artery and vein
49	Facial artery and vein
50	Cervical branch of facial nerve and submandibular gland
51	Internal jugular vein, common carotid artery, and omohyoid muscle
52	Anterior jugular vein and thyroid gland
53	Jugular venous arch
54	Left brachiocephalic vein
55	Pericardium of heart (location of right atrium)
56	Transverse cervical artery



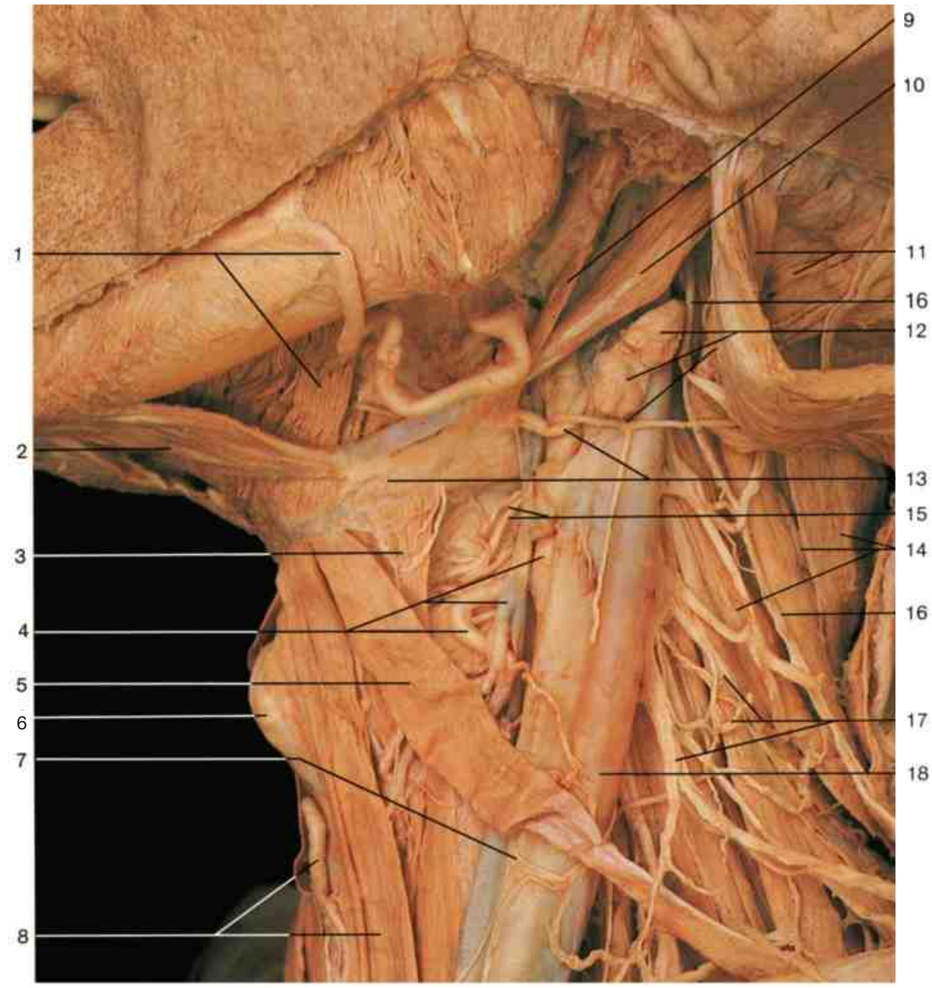
Veins of head and neck (anterior aspect). Part of the thoracic wall, clavicle, and sternocleidomastoid muscle have been removed. Veins are colored blue; arteries, red.

The **internal jugular vein** is the continuation of the sigmoid sinus, which drains most of the venous blood from the brain together with the external cerebrospinal fluid. By joining the subclavian vein, it forms the right brachiocephalic vein, which continues on the right side directly into the superior vena cava. The common way to introduce the lead from a pacemaker device into the heart is by way of the cephalic vein. On the left side, the thoracic duct joins the internal jugular vein at the point where the subclavian vein and the internal jugular vein form the left brachiocephalic vein. Note that the subclavian vein lies in front of the scalenus anterior muscle, whereas the subclavian artery and the brachial plexus lie posterior to that muscle. The **cephalic vein** joins the axillary vein by passing into the deltopectoral triangle. **The subclavian vein** is strongly fixed to the first rib, so it can be punctured with a needle at that point (underneath the sternal end of the clavicle) to introduce a catheter (subclavian line).



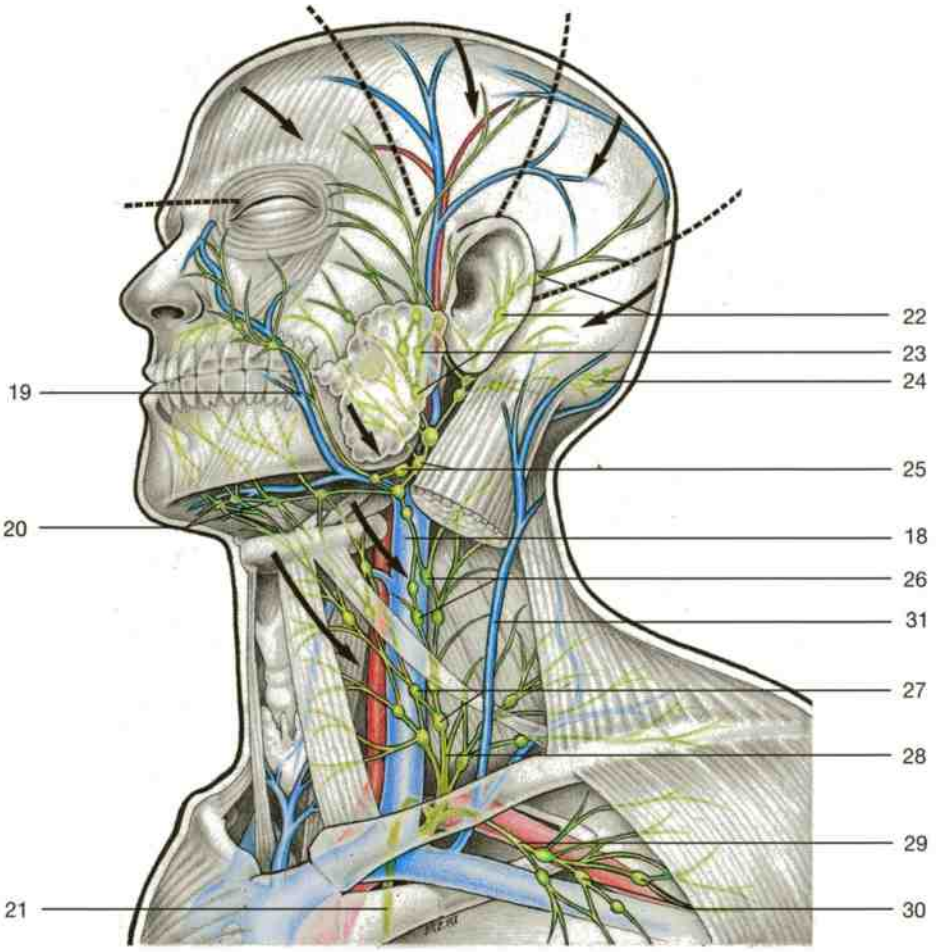
Lymph nodes and lymph vessels of the neck, left side oblique (oblique-lateral aspect). The sternocleidomastoid muscle and the left half of the thoracic wall have been removed. Lower part of the internal jugular vein has been cut and laterally displaced to show the thoracic duct.

1 Superficial parotid lymph node
2 Parotid gland
3 Great auricular nerve
4 Mandible
5 Facial vein
6 Anterior belly of digastric muscle
7 Submandibular gland
8 Submental lymph nodes
9 Superior thyroid artery
10 Thyroid cartilage
11 Omohyoid muscle
12 Sternohyoid muscle
13 Common carotid artery
14 Supraclavicular lymph nodes
15 Anterior jugular vein
16 Thoracic duct and internal jugular vein
17 Jugular venous arch
18 Left brachiocephalic vein
19 Superior mediastinal lymph nodes
20 Retro-auricular lymph nodes
21 Submandibular nodes
22 Superficial cervical lymph nodes
23 Jugulodigastric lymph nodes and jugular trunk
24 Internal jugular vein
25 External jugular vein
26 Jugulo-omohyoid lymph nodes
27 Brachial plexus
28 Cephalic vein
29 Subclavian trunk
30 Infraclavicular lymph nodes
31 Subclavian vein
32 Lung
33 Internal thoracic artery and vein

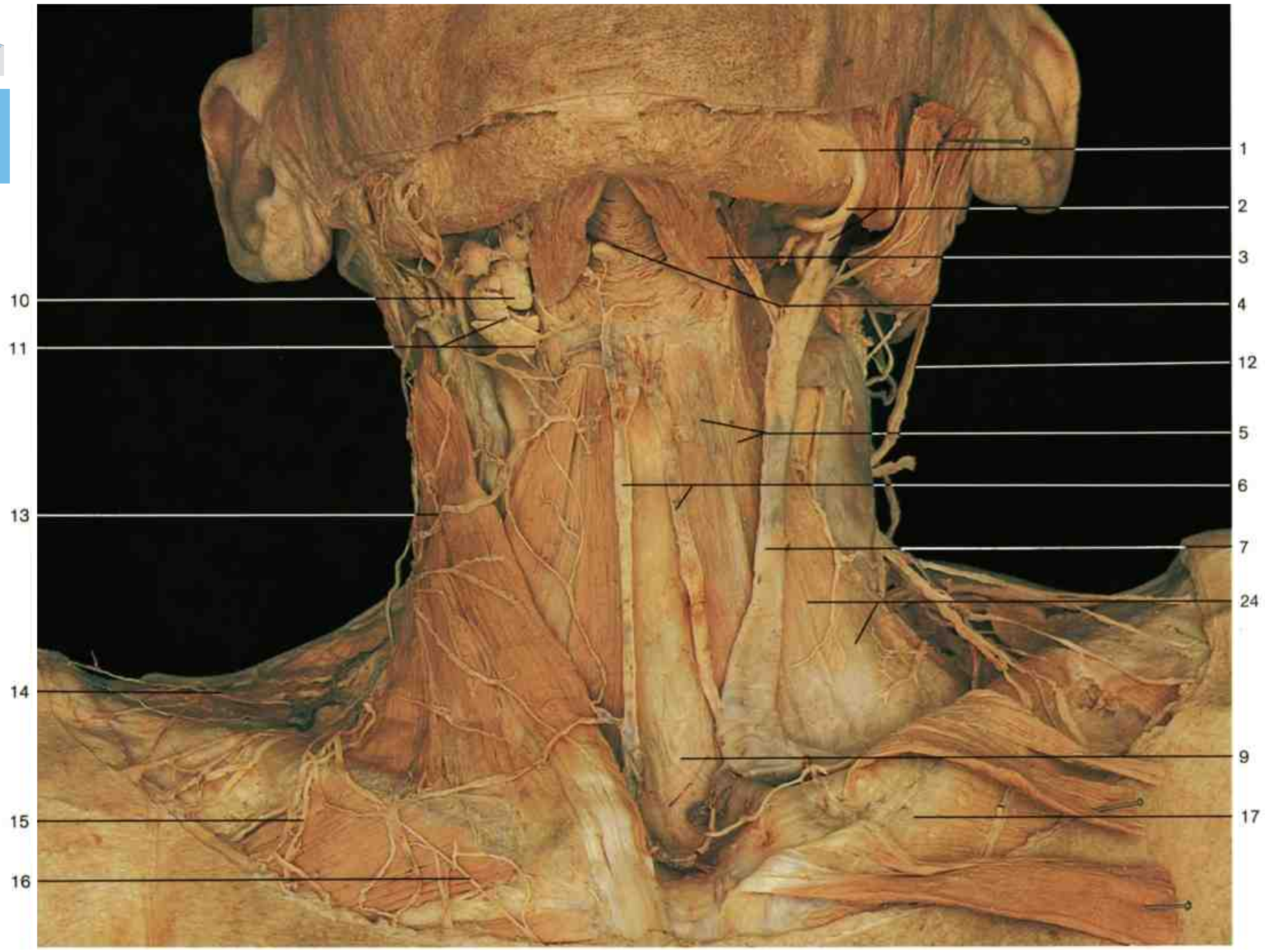


Carotid triangle, left side (lateral aspect). Sternocleidomastoid muscle reflected.

1 Mylohyoid muscle and facial artery
2 Anterior belly of digastric muscle
3 Thyrohyoid
4 External carotid artery, superior thyroid artery, and vein
5 Omohyoid muscle
6 Thyroid cartilage
7 Ansa cervicalis
8 Sternohyoid muscle and superior thyroid artery
9 Stylohyoid muscle
10 Posterior belly of digastric muscle
11 Sternocleidomastoid muscle (reflected)
12 Superior cervical lymph nodes and sternocleidomastoid artery
13 Hyoid bone and hypoglossal nerve (n. XII)
14 Splenius capitis and levator scapulae muscles
15 Superior laryngeal artery and internal branch of superior laryngeal nerve
16 Accessory nerve
17 Cervical plexus
18 Internal jugular vein
19 Facial vein
20 Submental nodes
21 Thoracic duct
22 Retro-auricular nodes
23 Parotid nodes
24 Occipital nodes
25 Submandibular nodes
26 Jugulodigastric nodes } deep cervical
27 Jugulo-omohyoid nodes } nodes
28 Jugular trunk
29 Subclavian trunk
30 Infraclavicular nodes
31 External jugular vein

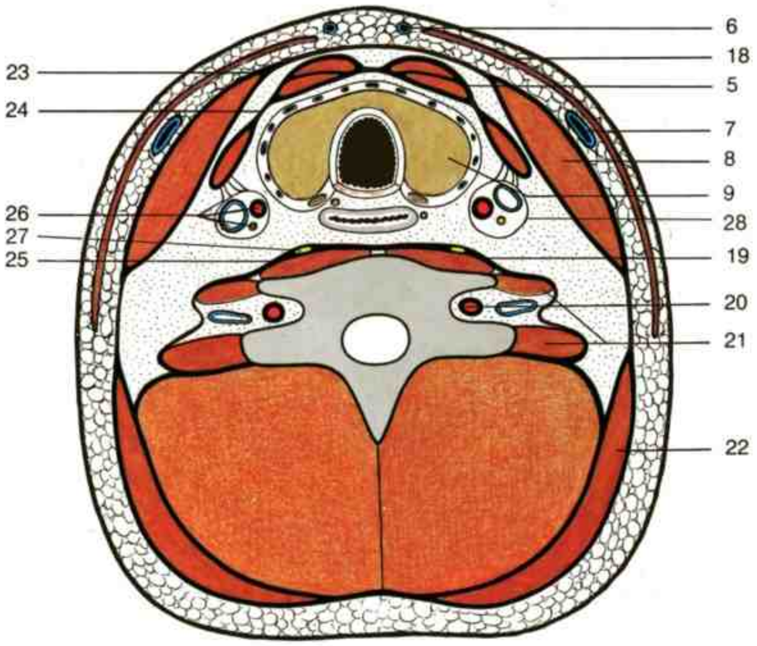


Lymph nodes and veins of head and neck. Dotted lines = border between irrigation areas; arrows: direction of lymph flow.

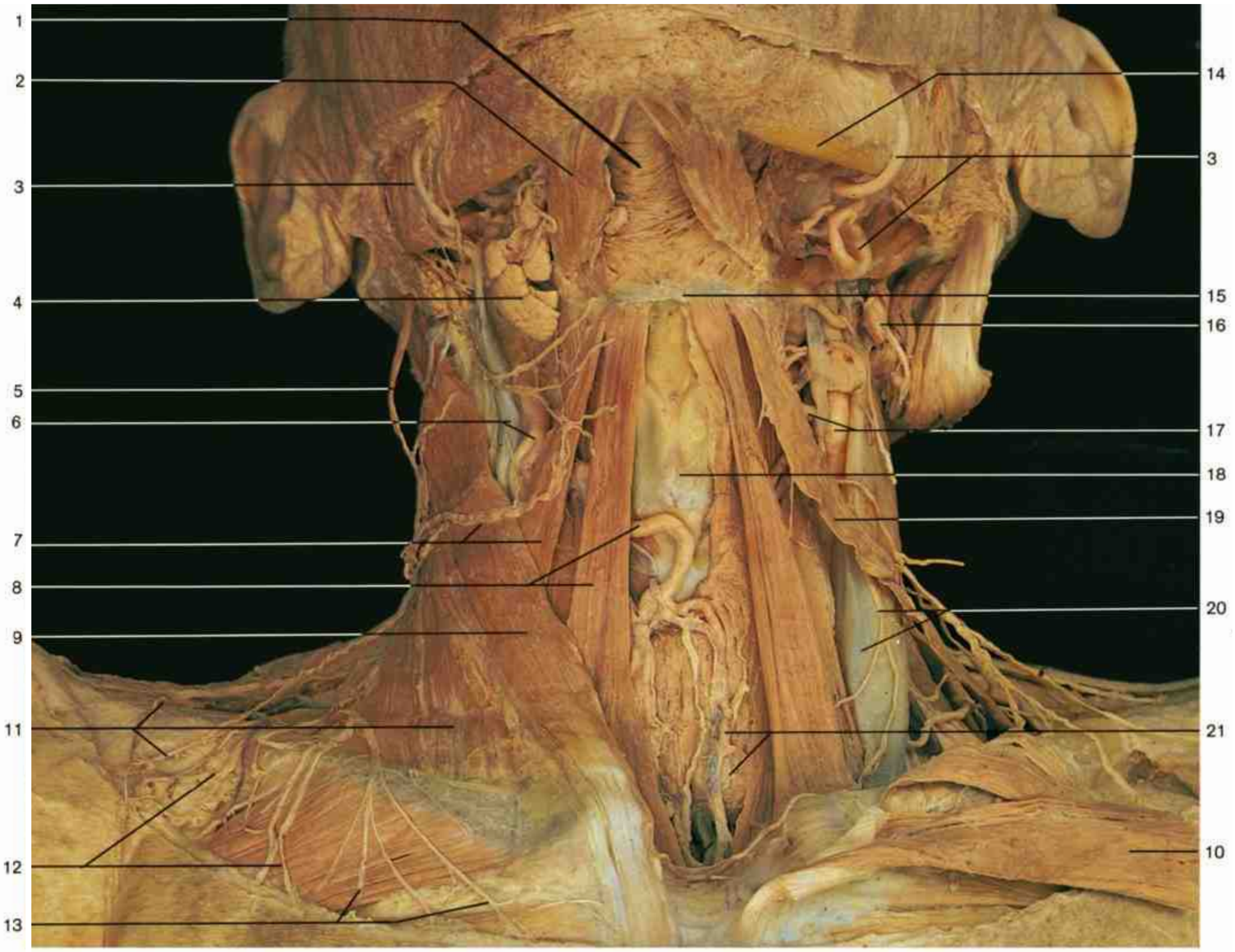


Anterior region of the neck. The superficial fascia has been removed.

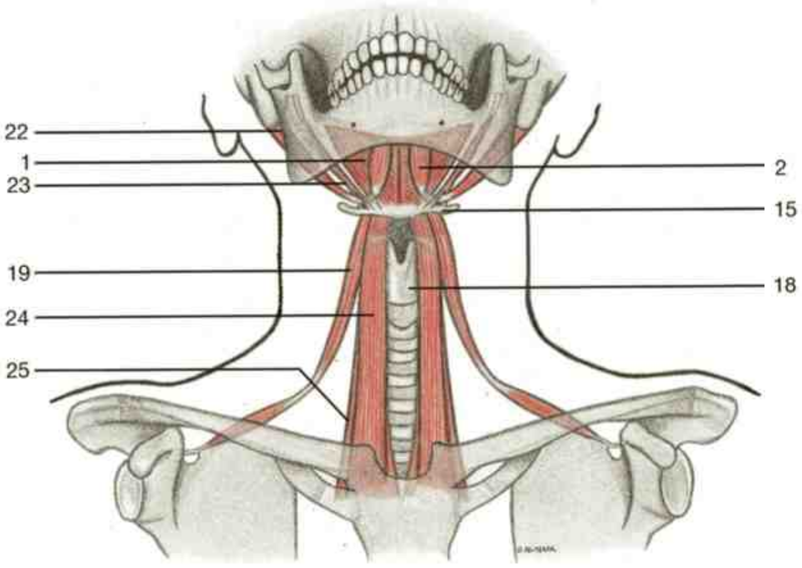
1 Mandible
2 Facial artery and vein
3 Anterior belly of digastric muscle
4 Mylohyoid muscle
5 Infrahyoid muscles (sternohyoid, sternothyroid, and omohyoid muscles)
6 Anterior jugular veins
7 External jugular vein
8 Sternocleidomastoid muscle
9 Thyroid gland
10 Submandibular gland
11 Cervical branch of facial nerve
12 Great auricular nerve
13 Transverse cervical nerves
14 Lateral supraclavicular nerves
15 Middle supraclavicular nerves
16 Medial supraclavicular nerves
Cutaneous branches of cervical plexus (12–16)
17 Clavicle
18 Platysma muscle
19 Prevertebral lamina of cervical fascia, covering longus colli muscle
20 Vertebral artery and vein
21 Scalenus muscles
22 Trapezius muscle
23 Superficial lamina of cervical fascia
24 Pretracheal lamina of cervical fascia
25 Prevertebral lamina of cervical fascia
26 Carotid sheath with common carotid artery, internal jugular vein, and vagus nerve
27 Cervical part of sympathetic trunk
28 Carotid sheath



◁ **Cross section of the neck** at the level of the thyroid gland. Notice the position of the three laminae of cervical fascia (23, 24, 25).

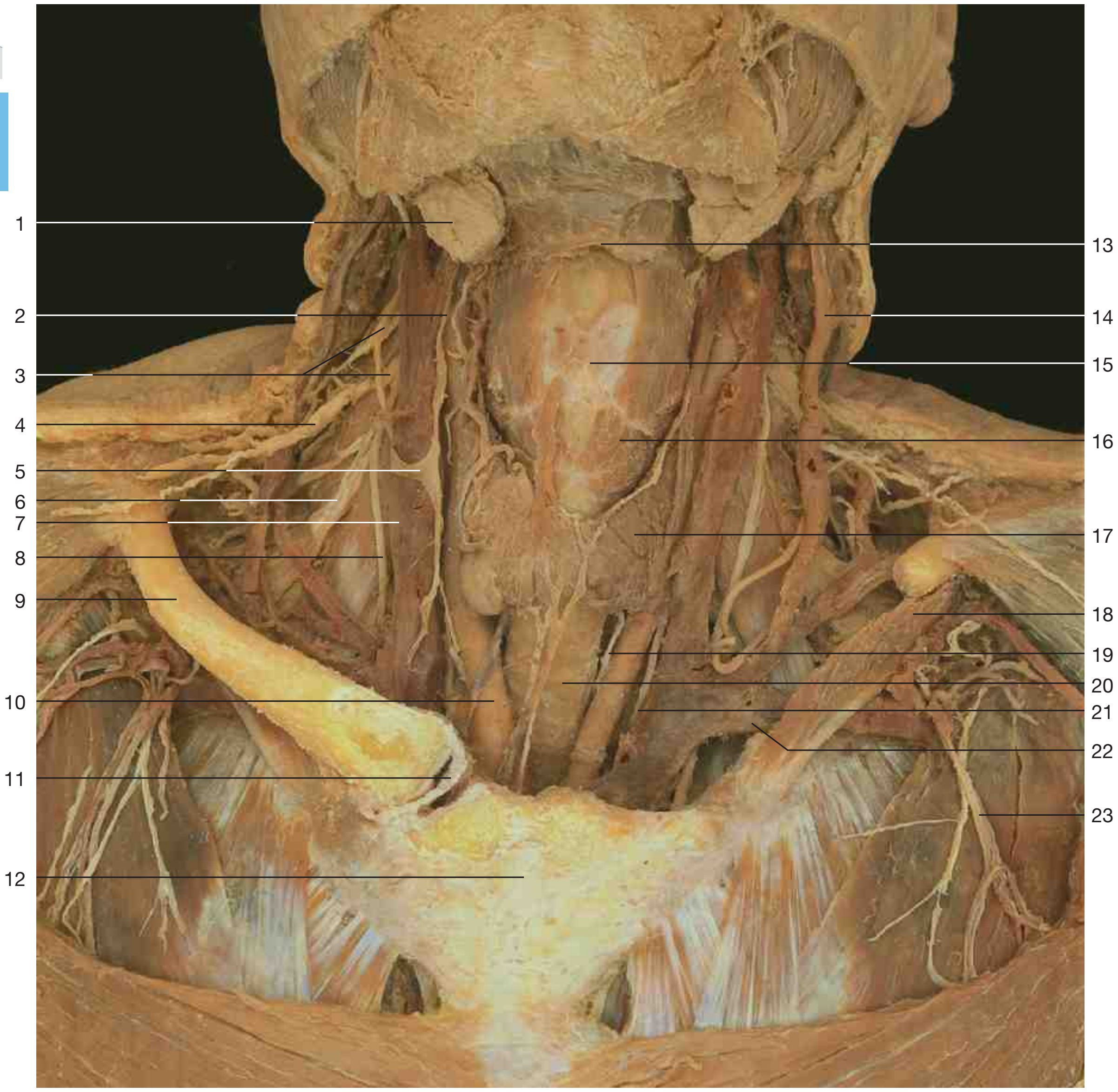


Anterior region of the neck with anterior triangle. The pretracheal lamina of cervical fascia and left sternocleidomastoid muscle have been removed.



Supra- and infrahyoid muscles (schematic drawing).

1 Mylohyoid muscle
2 Anterior belly of digastric muscle
3 Facial artery
4 Submandibular gland
5 Great auricular nerve
6 Internal jugular vein and common carotid artery
7 Transverse cervical nerve and omohyoid muscle
8 Sternohyoid muscle and superior thyroid artery
9 Sternocleidomastoid muscle (sternal head)
10 Left sternocleidomastoid muscle (reflected)
11 Sternocleidomastoid muscle (clavicular head) and lateral supraclavicular nerves
12 Middle supraclavicular nerves
13 Medial supraclavicular nerves
14 Mandible
15 Hyoid bone
16 Superficial cervical lymph nodes
17 Left superior thyroid artery and external carotid artery
18 Thyroid cartilage
19 Omohyoid muscle (superior belly)
20 Internal jugular vein and branches of ansa cervicalis
21 Thyroid gland and unpaired inferior thyroid vein
22 Posterior belly of digastric muscle
23 Stylohyoid muscle
24 Sternohyoid muscle
25 Sternothyroid muscle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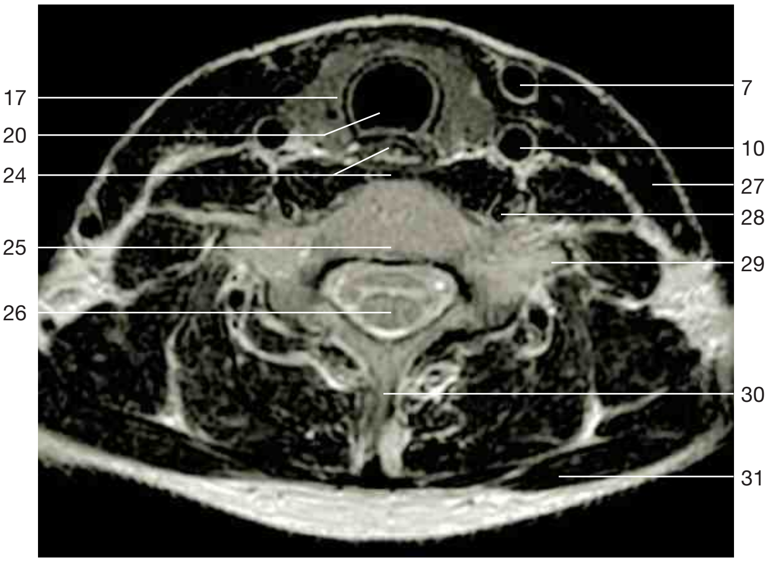
Anterior region of the neck. Sternocleidomastoid muscles and left clavicle have been removed. Thyroid gland in relation to trachea, larynx, and vessels of the neck is shown.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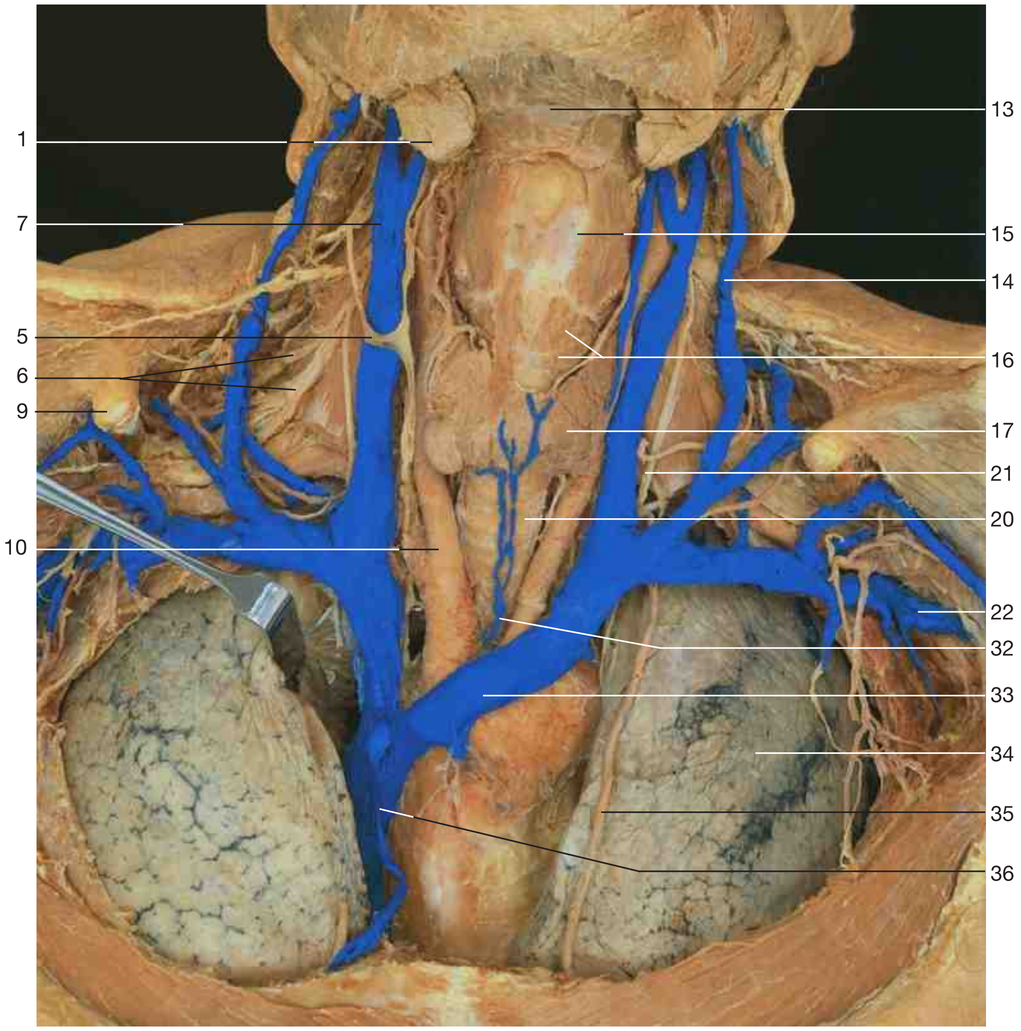
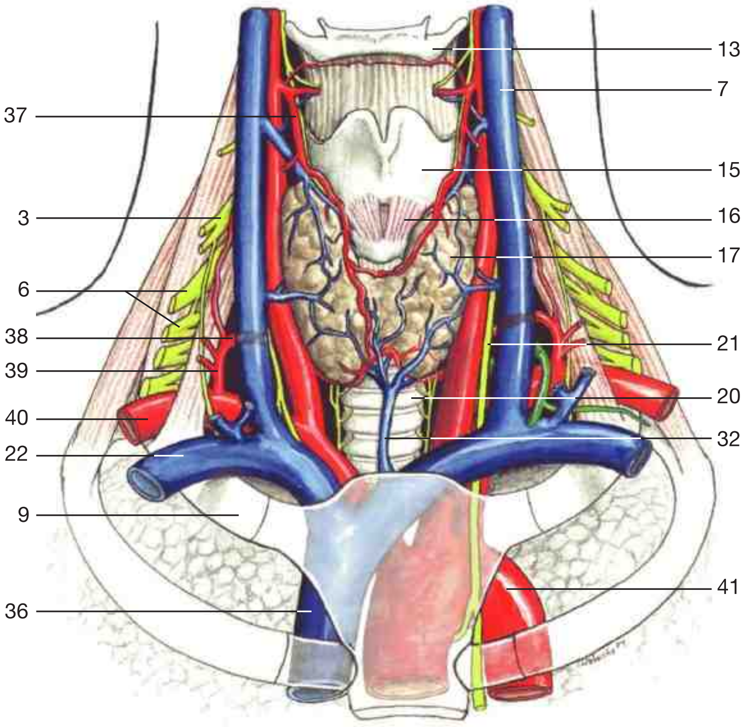
Cross section of the neck at the level of the thyroid gland (MRI scan, courtesy of Prof. Heuck, Munich).

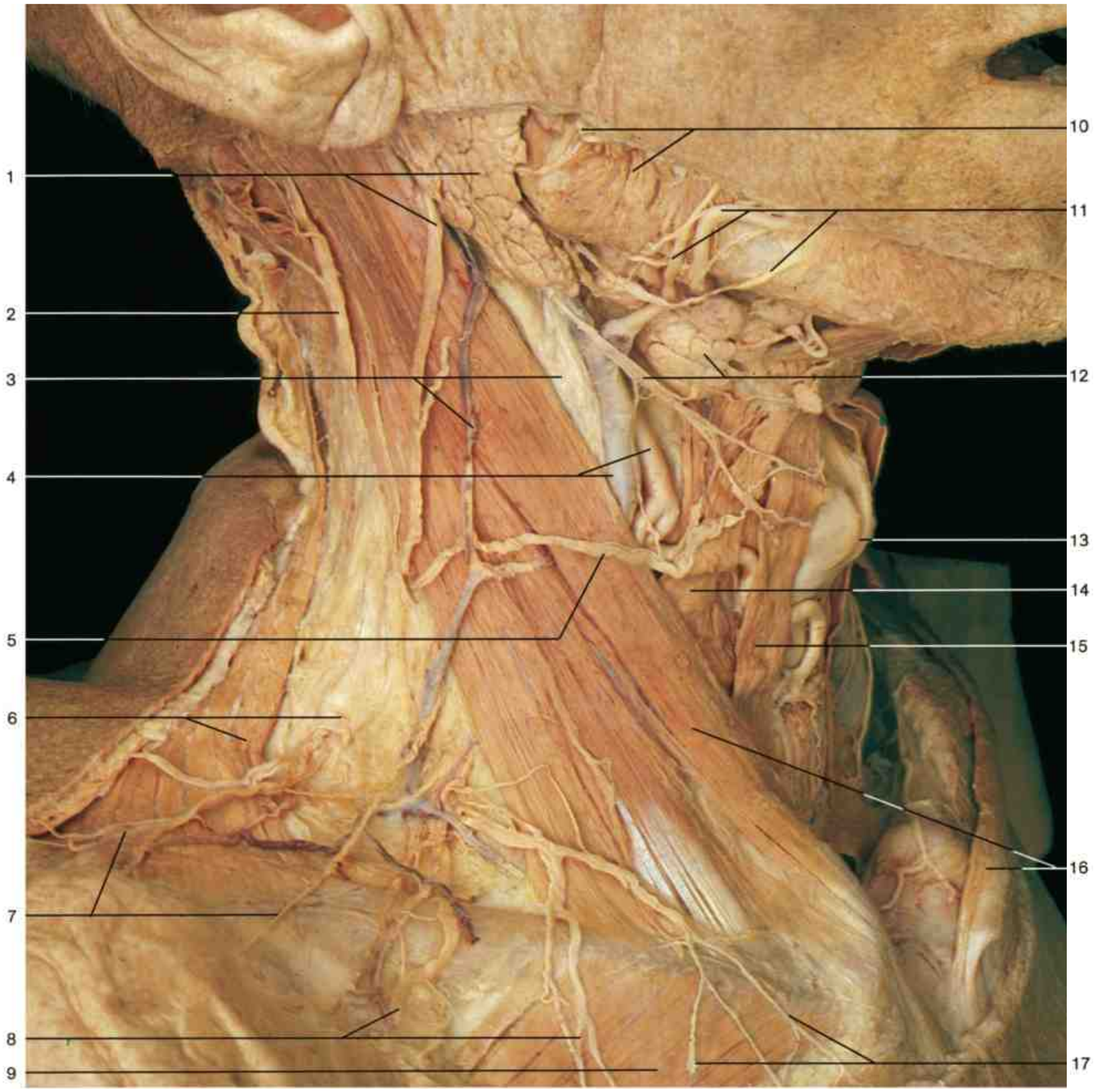


Anterior region of the neck and thoracic cavity. Both clavicles, sternum, and ribs have been removed. Main veins are colored in blue.



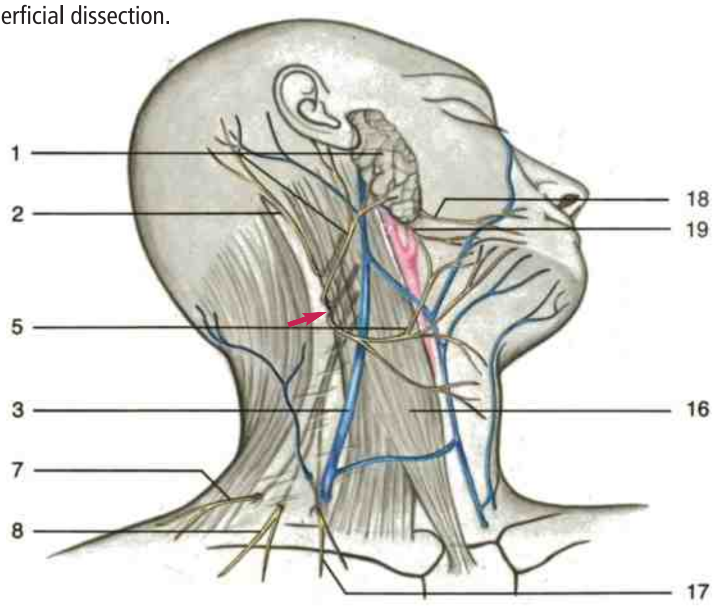
Anterior region of the neck (schematic drawing). Regional anatomy of the thyroid gland with related blood vessels.

1 Submandibular gland
2 Cervical branch of facial nerve (n. VII)
3 Cervical plexus
4 Middle supraclavicular nerves
5 Ansa cervicalis
6 Brachial plexus
7 Internal jugular vein
8 Phrenic nerve
9 Clavicle
10 Common carotid artery
11 Sternoclavicular articulation with articular disc
12 Manubrium of sternum
13 Hyoid bone
14 External jugular vein
15 Thyroid cartilage
16 Cricothyroid muscle
17 Thyroid gland
18 Subclavius muscle
19 Recurrent laryngeal nerve
20 Trachea
21 Vagus nerve (n. X)
22 Subclavian vein
23 Middle pectoral nerve
24 Esophagus
25 Body of cervical vertebra
26 Spinal cord
27 Sternocleidomastoid muscle
28 Vertebral artery
29 Transverse process of cervical vertebra
30 Spinous process of cervical vertebra
31 Trapezius muscle
32 Inferior thyroid vein
33 Left brachiocephalic vein
34 Superior lobe of left lung
35 Internal thoracic artery
36 Superior vena cava
37 Superior thyroid artery
38 Inferior thyroid artery
39 Thyrocervical trunk
40 Subclavian artery
41 Aortic arch

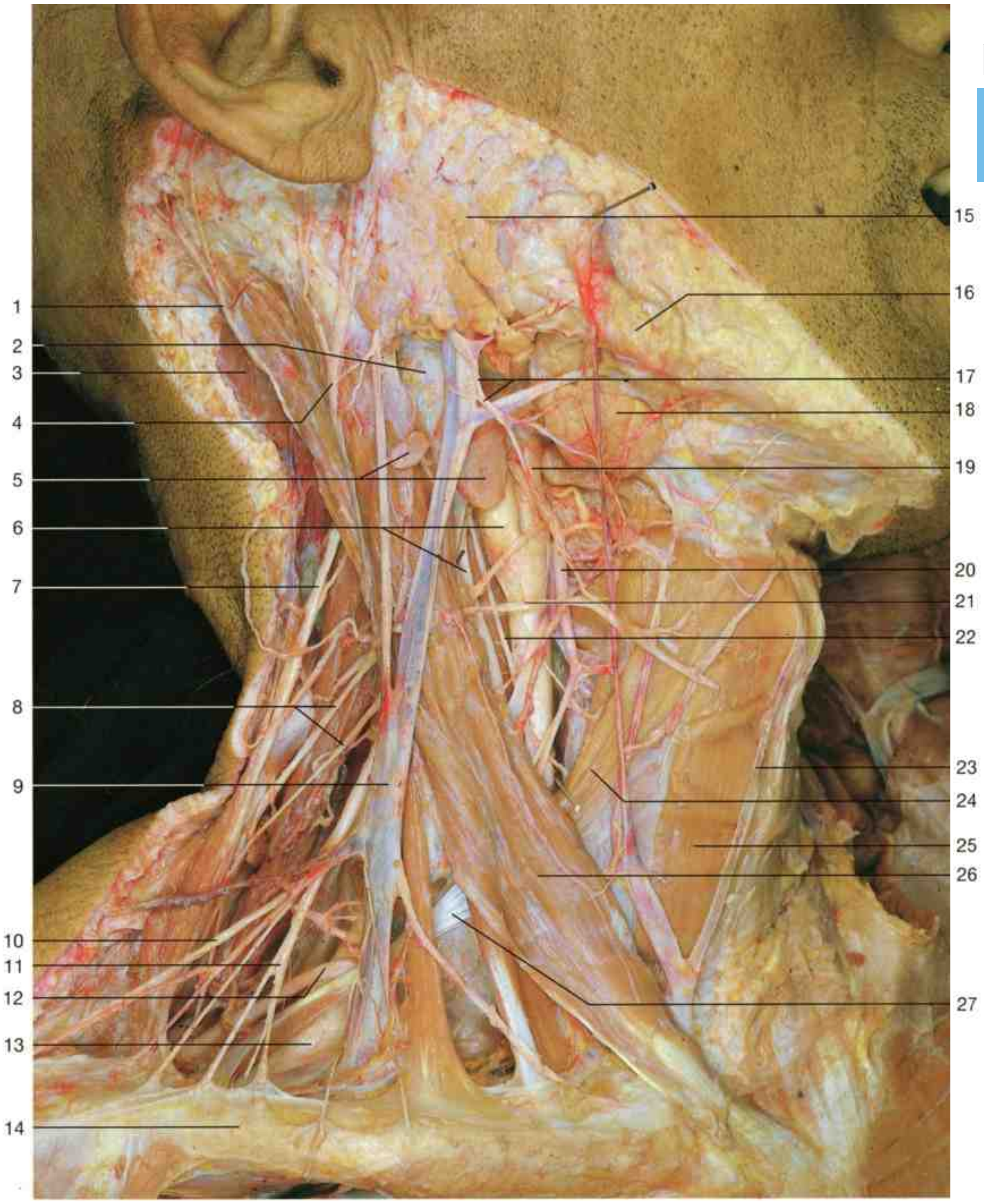


Lateral region of the neck with posterior and carotid triangles. Superficial dissection.

1 Parotid gland and great auricular nerve
2 Lesser occipital nerve
3 Internal and external jugular veins
4 Retromandibular vein and external carotid artery
5 Transverse cervical nerve with communicating branch to cervical branch of facial nerve
6 Trapezius muscle and superficial lamina of cervical fascia
7 Lateral supraclavicular nerves
8 Middle supraclavicular nerves
9 Pectoralis major muscle
10 Buccal branch of facial nerve and masseter muscle
11 Facial artery and vein and mandibular branch of facial nerve
12 Cervical branch of facial nerve and submandibular gland
13 Thyroid cartilage
14 Omohyoid muscle
15 Sternohyoid muscle
16 Sternocleidomastoid muscle
17 Medial supraclavicular nerves
18 Mandibular branch of facial nerve
19 Cervical branch of facial nerve with communicating branch to transverse cervical nerve

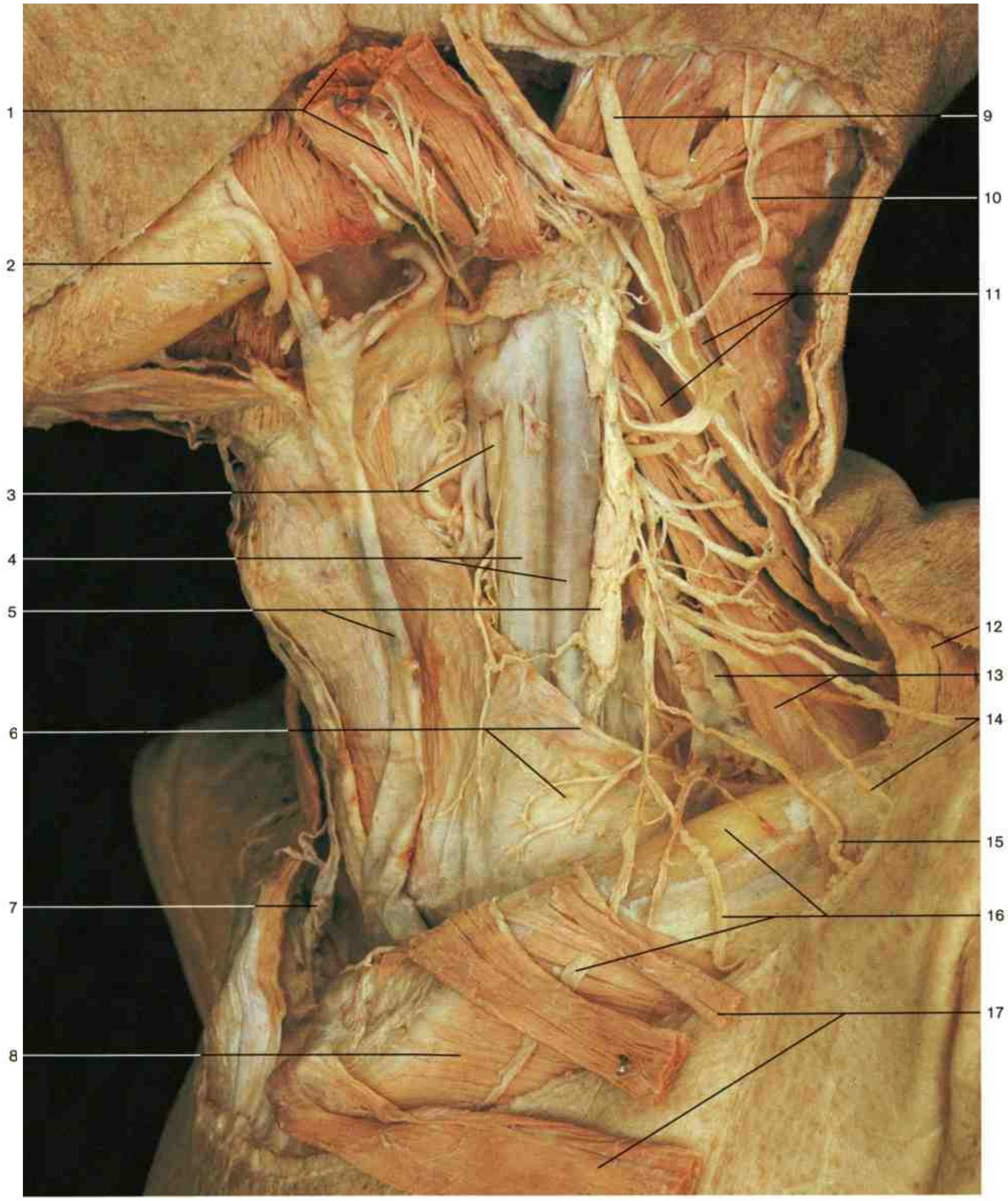


Cutaneous branches of cervical plexus. Erb's point is indicated by an arrowhead (schematic drawing).



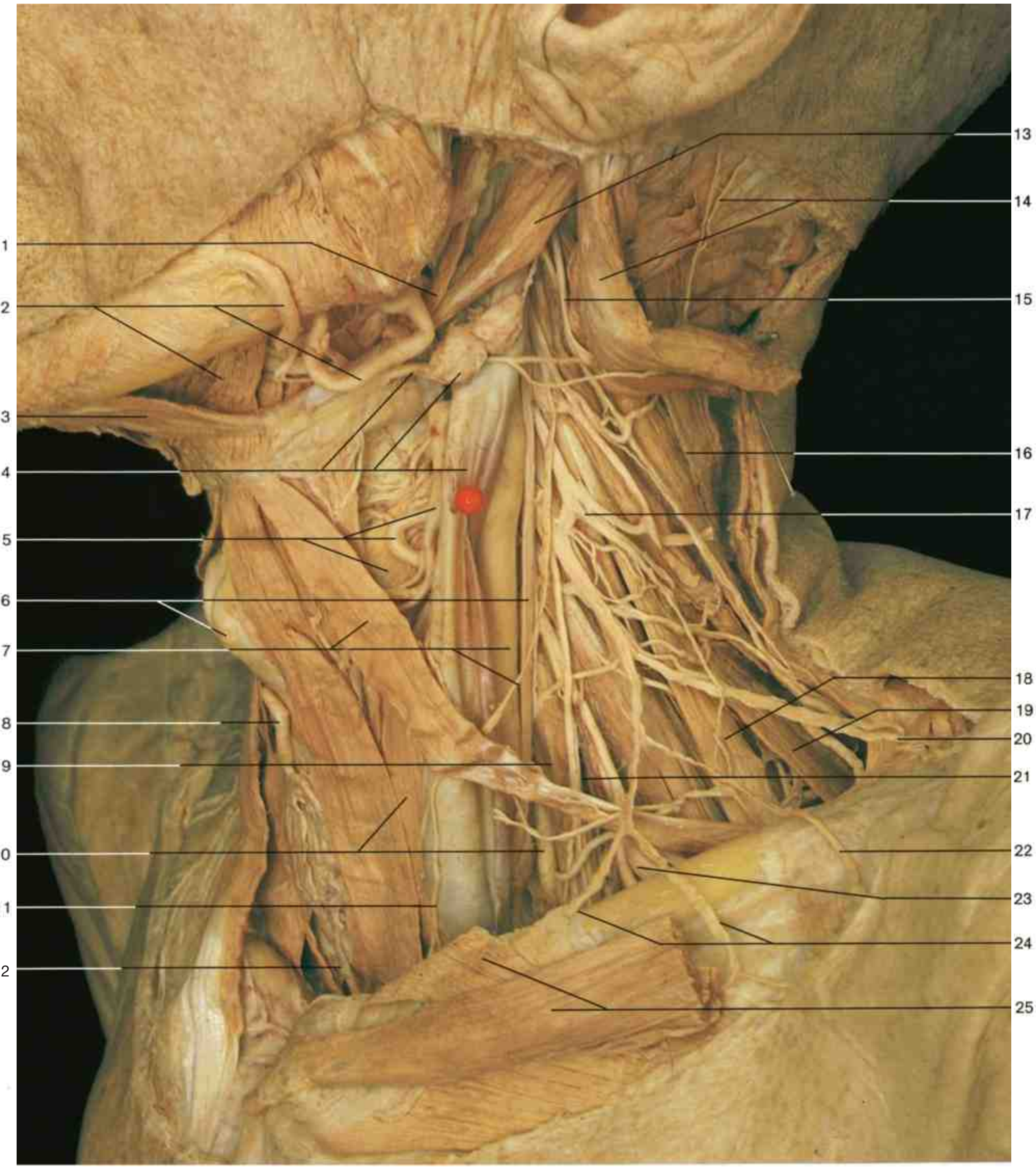
Lateral region of the neck with posterior and carotid triangles. Superficial dissection. The superficial lamina of cervical fascia has been removed to display the cutaneous branches of the cervical plexus and subcutaneous veins.

1	Lesser occipital nerve	15	Parotid gland
2	Internal jugular vein	16	Mandible
3	Splenius capitis muscle	17	Cervical branch of facial nerve
4	Great auricular nerve	18	Submandibular gland
5	Submandibular nodes	19	External carotid artery
6	Internal carotid artery and vagus nerve	20	Superior thyroid artery
7	Accessory nerve	21	Transverse cervical nerve
8	Muscular branches of cervical plexus	22	Superior root of ansa cervicalis
9	External jugular vein	23	Anterior jugular vein
10	Posterior supraclavicular nerves	24	Omohyoid muscle
11	Middle supraclavicular nerves	25	Sternohyoid muscle
12	Suprascapular artery	26	Sternocleidomastoid muscle
13	Pretracheal lamina of fascia of neck	27	Intermediate tendon of omohyoid muscle
14	Clavicle		



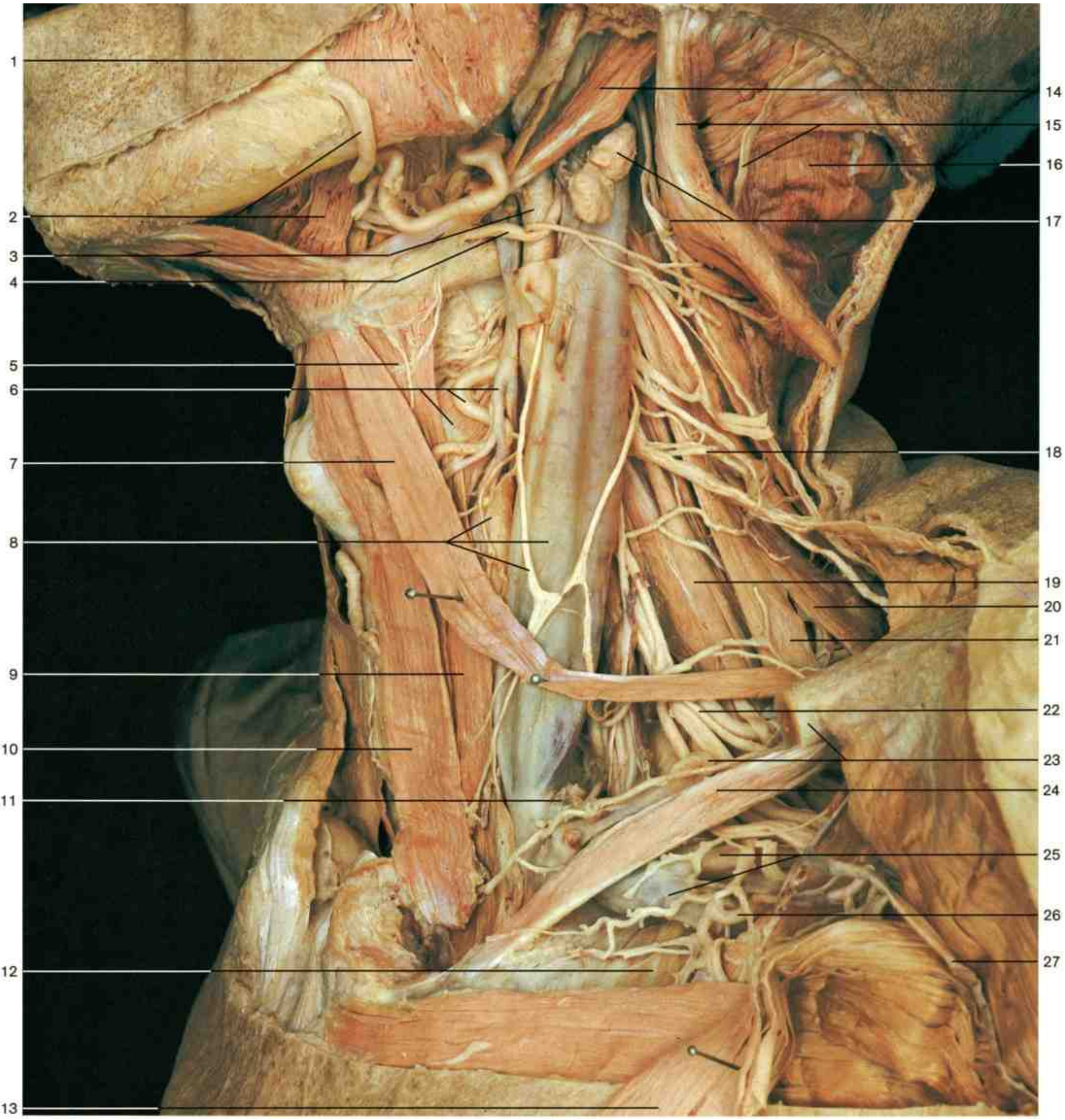
Neck, superficial dissection (lateral aspect). Sternocleidomastoid muscle has been cut and reflected to display the pretracheal lamina of the cervical fascia.

1 Sternocleidomastoid muscle (reflected) and branch of accessory nerve
2 Facial artery
3 External carotid artery and superior thyroid artery
4 Internal jugular vein
5 Deep cervical lymph nodes and external jugular vein
6 Omohyoid muscle and pretracheal lamina of cervical fascia
7 Anterior jugular vein
8 Pectoralis major muscle
9 Great auricular nerve
10 Lesser occipital nerve
11 Splenius capitis and levator scapulae muscles
12 Trapezius muscle
13 Scalenus medius muscle and brachial plexus
14 Posterior supraclavicular nerves
15 Middle supraclavicular nerve
16 Clavicle and anterior supraclavicular nerves
17 Sternocleidomastoid muscle (reflected)



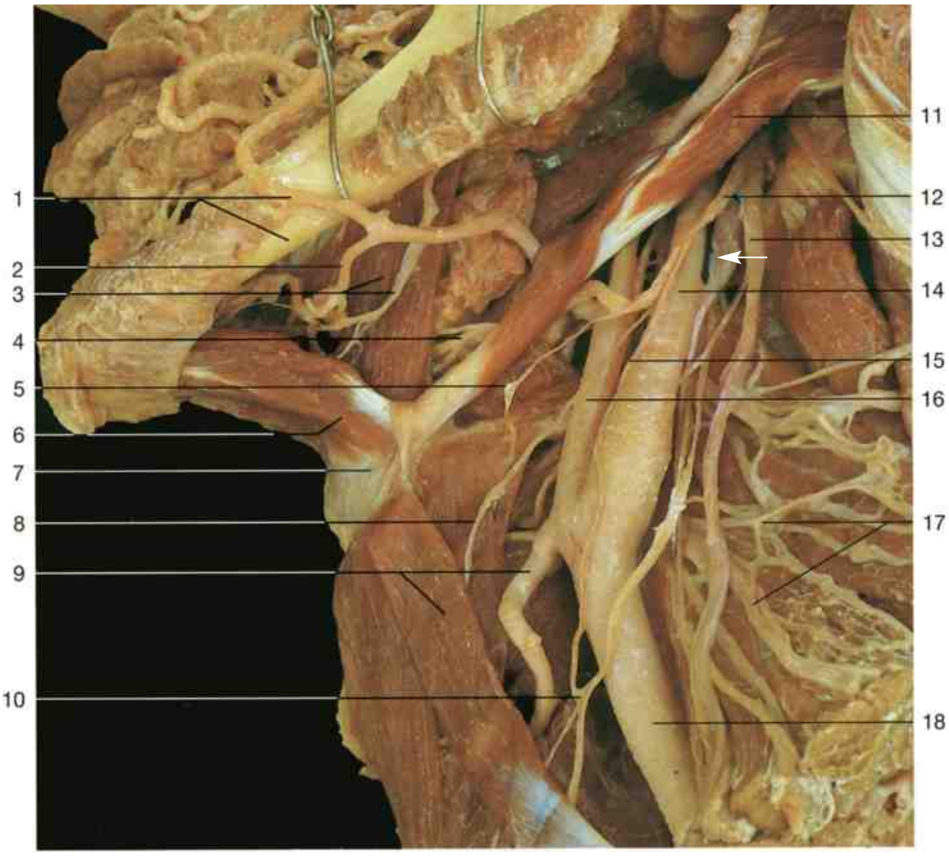
Neck, deep dissection (lateral aspect). The internal jugular vein has been reflected to expose the carotid artery and vagus nerve.

1	Stylohyoid muscle	13	Posterior belly of digastric muscle
2	Facial artery and mylohyoid muscle	14	Sternocleidomastoid muscle and lesser occipital nerve
3	Anterior belly of digastric muscle	15	Accessory nerve
4	Internal jugular vein, hypoglossal nerve, and superficial cervical lymph nodes	16	Splenius capitis muscle
5	Superior thyroid artery and vein and inferior pharyngeal constrictor muscle	17	Cervical plexus
6	Thyroid cartilage and vagus nerve	18	Scalenus posterior muscle
7	Ansa cervicalis, omohyoid muscle, and common carotid artery	19	Levator scapulae muscle
8	Right superior thyroid artery	20	Posterior supraclavicular nerves
9	Scalenus anterior muscle	21	Phrenic nerve
10	Sternothyroid muscle and inferior thyroid artery	22	Middle supraclavicular nerve
11	Muscular branches of ansa cervicalis to the infrahyoid muscles	23	Brachial plexus
12	Inferior thyroid vein	24	Anterior supraclavicular nerves
		25	Sternocleidomastoid muscle



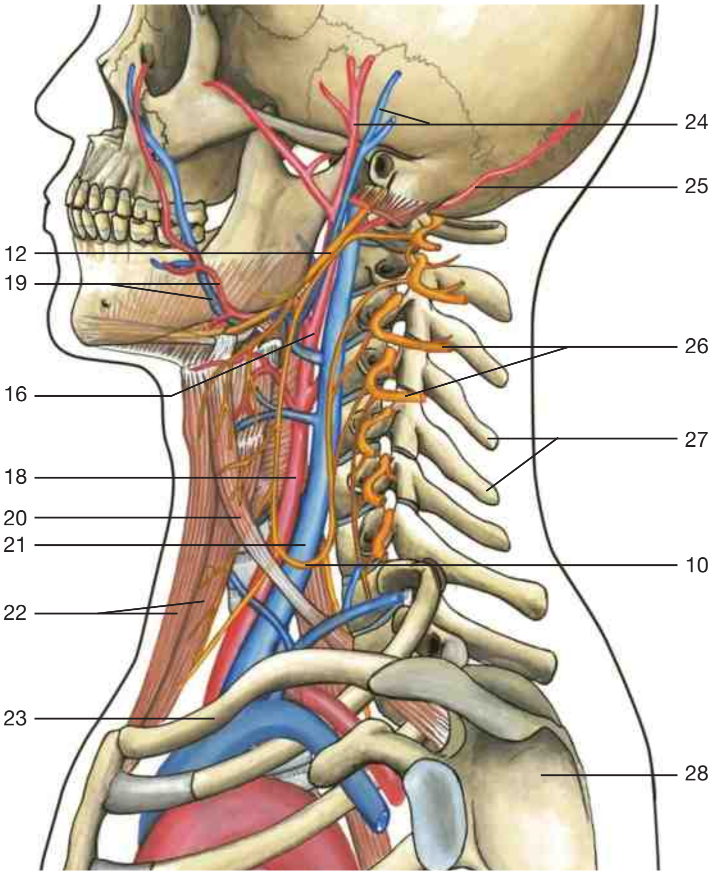
Neck, deeper dissection (lateral aspect). **Ansa cervicalis.** The cervical fascia and the clavicle are partly removed. Ansa cervicalis and infrahyoid muscles are displayed.

1	Masseter muscle
2	Mylohyoid muscle and facial artery
3	External carotid artery and anterior belly of digastric muscle
4	Hypoglossal nerve
5	Thyrohyoid muscle
6	Superior thyroid artery and vein and inferior pharyngeal constrictor muscle
7	Omohyoid muscle (superior belly)
8	Ansa cervicalis, thyroid gland, and internal jugular vein
9	Sternothyroid muscle
10	Sternohyoid muscle
11	Thoracic duct
12	Pectoralis minor muscle
13	Pectoralis major muscle
14	Posterior belly of digastric muscle
15	Sternocleidomastoid muscle and lesser occipital nerve
16	Splenius capitis muscle
17	Superficial cervical lymph nodes and accessory nerve
18	Cervical plexus
19	Scalenus medius muscle
20	Levator scapulae muscle
21	Scalenus posterior muscle
22	Brachial plexus
23	Transverse cervical artery and clavicle
24	Subclavius muscle
25	Subclavian artery and vein
26	Thoraco-acromial artery
27	Cephalic vein

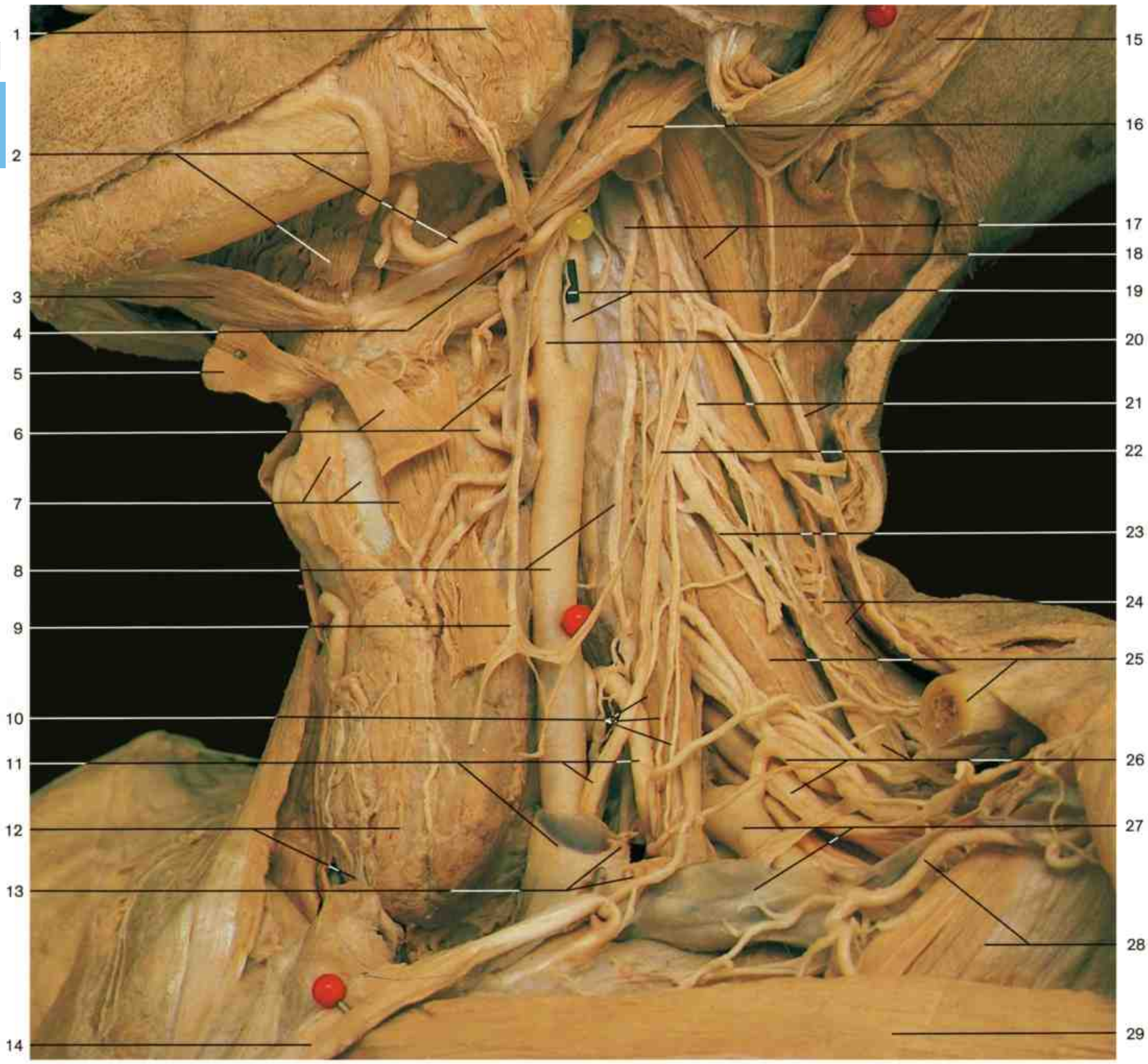


Neck with submandibular region (lateral aspect). **Hypoglossal nerve** (n. XII). Mandible slightly elevated. Arrow = superior cervical ganglion.

1	Facial artery and mandible
2	Submental artery
3	Mylohyoid muscle and nerve
4	Hypoglossal nerve (lingual branches)
5	Thyrohyoid branch of hypoglossal nerve (n. XII)
6	Anterior belly of digastric muscle
7	Hyoid bone
8	Omohyoid branch of hypoglossal nerve (n. XII)
9	Omohyoid muscle and superior thyroid artery
10	Ansa cervicalis
11	Posterior belly of digastric muscle
12	Hypoglossal nerve (n. XII)
13	Vagus nerve (n. X)
14	Internal carotid artery
15	Superior root of ansa cervicalis
16	External carotid artery
17	Cervical plexus
18	Common carotid artery
19	Facial artery and vein
20	Omohyoid muscle
21	Internal jugular vein
22	Sternohyoid and sternothyroid muscles
23	Clavicle
24	Superficial temporal artery and vein
25	Occipital artery
26	Spinal nerves (C_3 and C_4)
27	Spinal processes of cervical vertebrae (C_4 and C_5)
28	Scapula

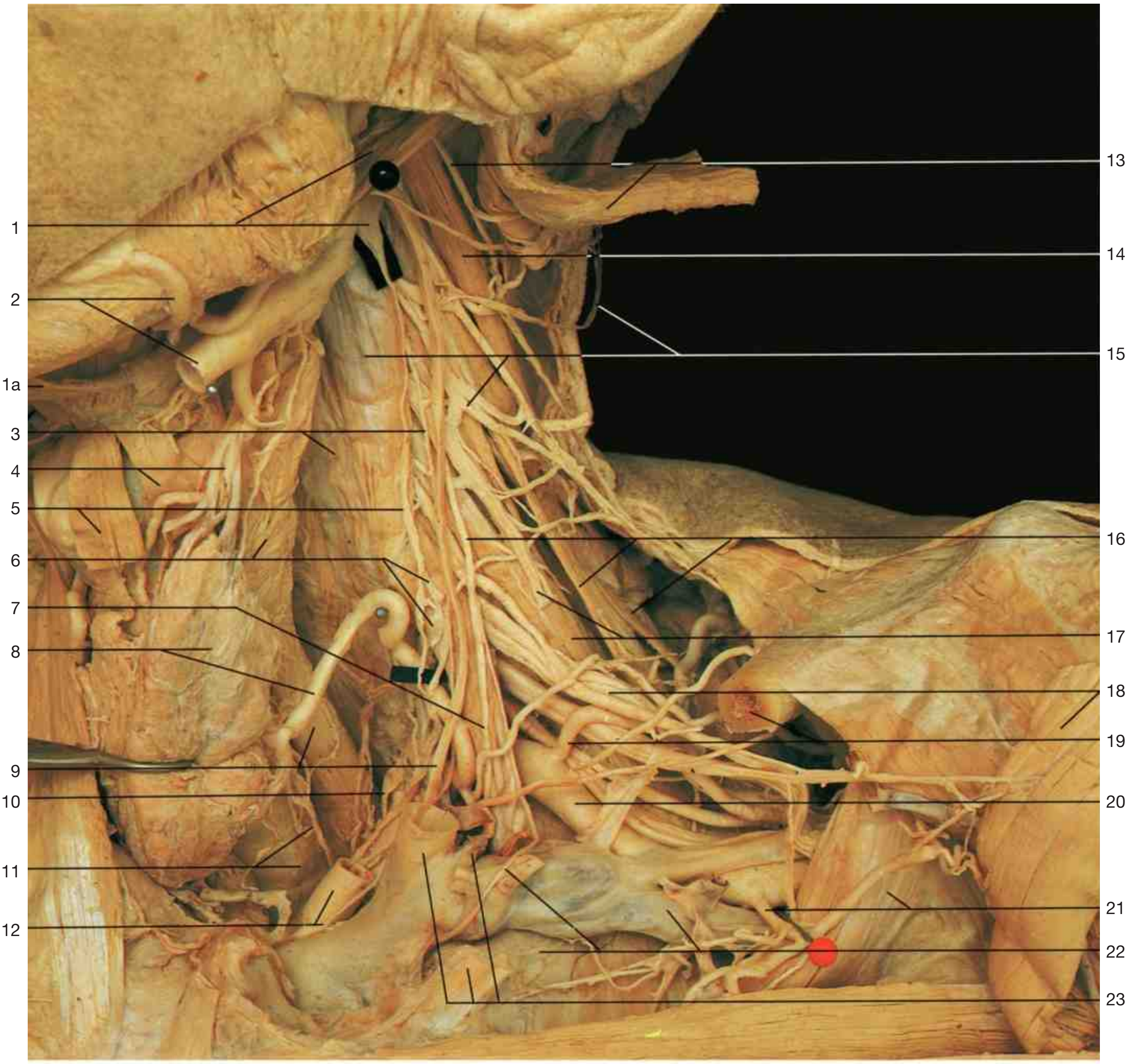


Nerves and vessels of the neck (lateral aspect).
The ansa cervicalis with connection to the spinal nerves is depicted.



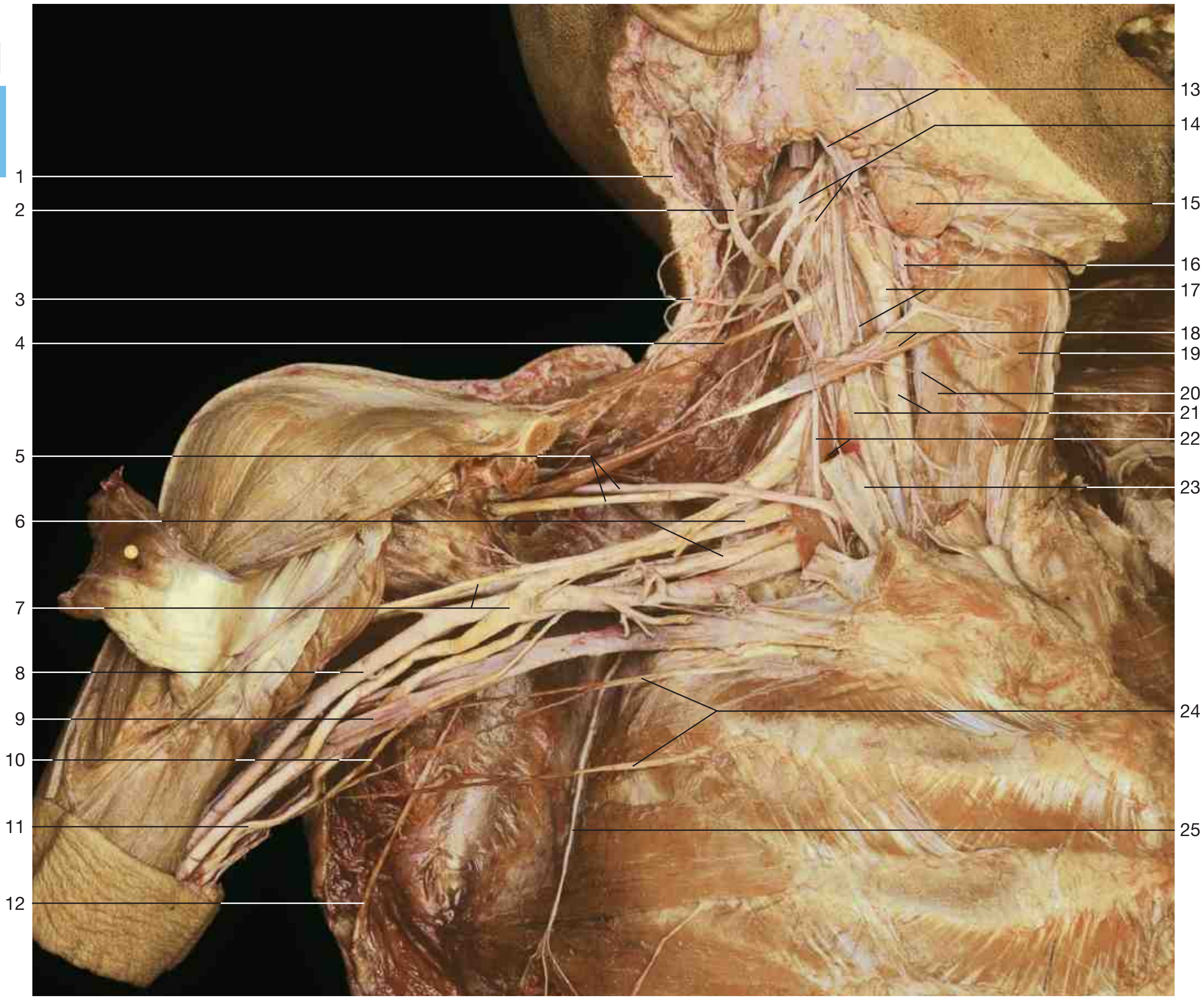
Neck, deeper dissection (lateral aspect). Clavicle partly removed to show the slit between the scalenus muscles. Internal jugular vein removed.

1 Masseter muscle
2 Mylohyoid muscle and facial artery
3 Anterior belly of digastric muscle
4 Hypoglossal nerve
5 Sternohyoid muscle
6 Omohyoid muscle, superior thyroid artery and vein
7 Sternothyroid muscle, thyroid cartilage, and pyramidal lobe of thyroid gland
8 Common carotid artery and sympathetic trunk
9 Ansa cervicalis
10 Phrenic nerve, ascending cervical artery, and anterior scalenus muscle
11 Inferior thyroid artery, vagus nerve, and internal jugular vein (cut)
12 Thyroid gland and unpaired inferior thyroid venous plexus
13 Thoracic duct and left subclavian trunk
14 Subclavius muscle (reflected)
15 Sternocleidomastoid muscle (reflected)
16 Posterior belly of digastric muscle
17 Superior cervical ganglion and splenius muscle
18 Lesser occipital nerve
19 Internal carotid artery and branch of the glossopharyngeal nerve to the carotid body
20 External carotid artery
21 Cervical plexus and accessory nerve
22 Inferior root of ansa cervicalis
23 Supraclavicular nerve
24 Levator scapulae muscle
25 Scalenus medius muscle and clavicle
26 Transverse cervical artery, brachial plexus, and scalenus posterior muscle
27 Subclavian artery and vein
28 Thoraco-acromial artery and pectoralis minor muscle
29 Pectoralis major muscle



Neck, deepest dissection (antero-lateral aspect). Thyroid gland reflected to expose the esophagus and the recurrent laryngeal nerve.

1	Superior cervical ganglion of sympathetic trunk and posterior belly of digastric muscle	12	Common carotid artery and cervical cardiac branch of vagus nerve
1a	Anterior belly of digastric muscle	13	Sternocleidomastoid muscle and accessory nerve
2	Facial artery and common carotid artery (reflected anteriorly)	14	Splenius capitis muscle
3	Ascending cervical artery and longus colli muscle	15	Lesser occipital nerve, longus capitis muscle, and cervical plexus
4	Omohyoid muscle and superior thyroid artery	16	Phrenic nerve, scalenus posterior muscle, and levator scapulae muscle
5	Sympathetic trunk and sternohyoid muscle	17	Supraclavicular nerves and scalenus medius muscle
6	Middle cervical ganglion and inferior pharyngeal constrictor muscle	18	Brachial plexus and pectoralis major muscle (clavicular head)
7	Scalenus anterior muscle and phrenic nerve	19	Transverse cervical artery and clavicle
8	Thyroid gland and inferior thyroid artery	20	Subclavian artery
9	Vagus nerve and esophagus	21	Thoraco-acromial artery and pectoralis minor muscle
10	Stellate ganglion	22	First rib, accessory phrenic nerve, and subclavian vein
11	Recurrent laryngeal nerve and trachea	23	Internal jugular vein, thoracic duct, and subclavius muscle



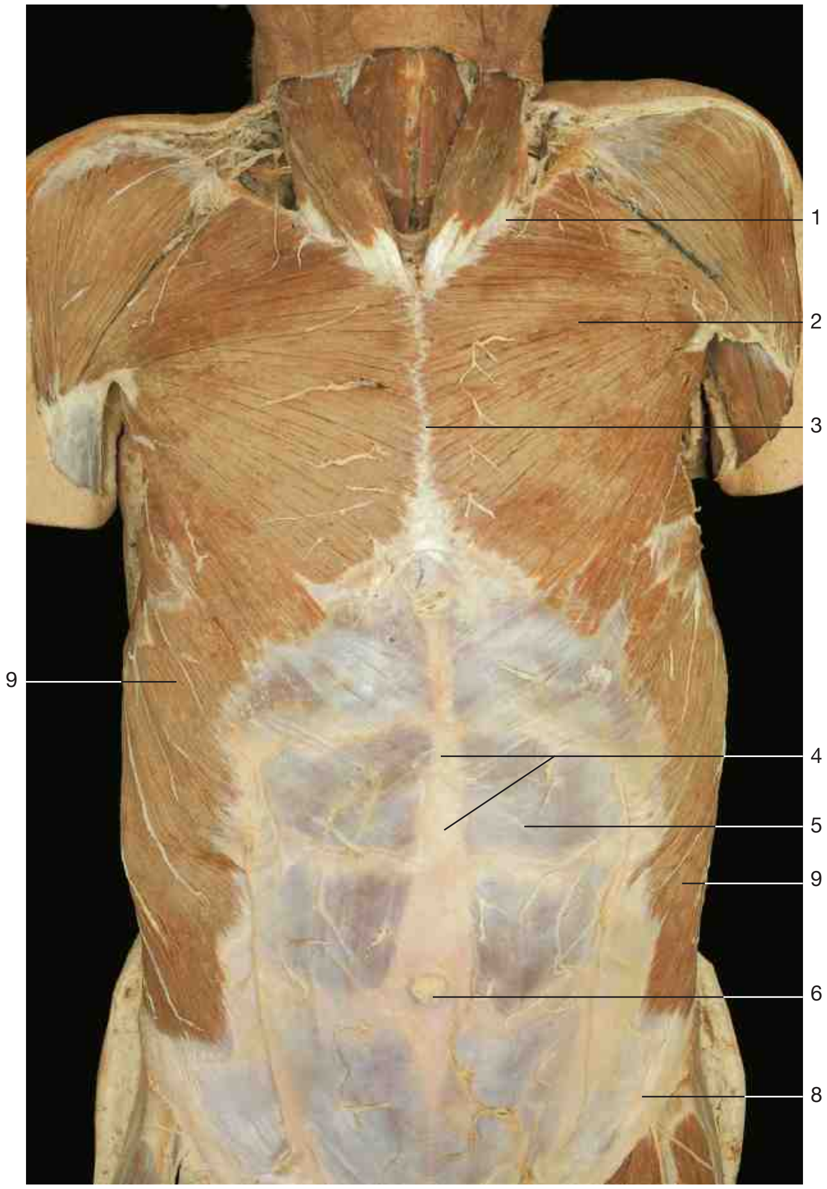
Neck and arm, deepest dissection (antero-lateral aspect). **Cervical and brachial plexuses** and their relation to the blood vessels are shown. Note the location and content of scalene triangle. Sternocleidomastoid muscle and clavicle have been removed; the internal jugular vein was divided to display the roots of cervical and brachial plexuses.

1	Lesser occipital nerve
2	Great auricular nerve
3	Cutaneous branches of cervical plexus
4	Supraclavicular nerve
5	Suprascapular nerve and artery
6	Brachial plexus
7	Median nerve (with two roots) and musculocutaneous nerve
8	Axillary artery
9	Axillary vein
10	Medial brachial cutaneous nerve
11	Ulnar nerve
12	Thoracodorsal nerve
13	Parotid gland and facial nerve (cervical branch)
14	Cervical plexus
15	Submandibular gland
16	Superior thyroid artery
17	Common carotid artery dividing in internal and external carotid artery and superior root of ansa cervicalis
18	Omohyoid muscle and cervical branch of facial nerve joining the transverse cervical nerve (C_2, C_3)
19	Sternohyoid muscle
20	Transverse cervical nerve and sternothyroid muscle
21	Common carotid artery and vagus nerve
22	Phrenic nerve and scalenus anterior muscle
23	Internal jugular vein
24	Intercostobrachial nerves
25	Long thoracic nerve

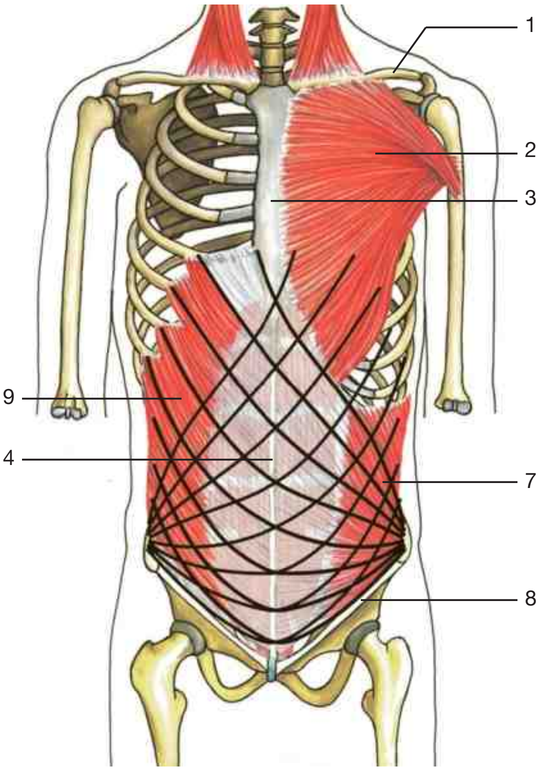
3 Trunk

The anterior abdominal and thoracic walls reveal a segmental structure. The ribs are connected by intercostal muscles forming defined skeleto-motoric and neuro-vascular segments.

At the abdominal wall, the segments form great flat muscles, that end anteriorly in strong sheet-like aponeuroses. The aponeurosis interlace at the linea alba with their counterparts from the opposite side to form the tough tendinous sheath of the rectus muscle. Movements of the abdominal wall also support the process of respiration functionally related to the diaphragm.

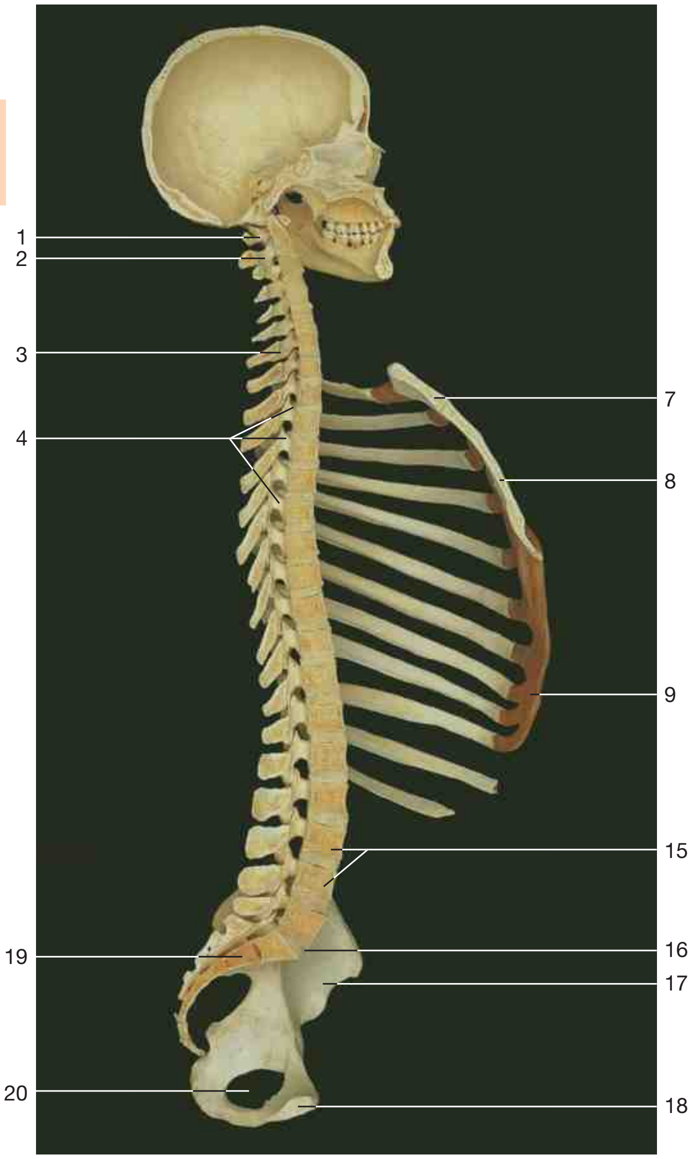


Anterior thoracic and abdominal walls with superficial musculature. The fascia of pectoralis major muscle and the abdominal wall have been removed; the anterior layer of the sheath of the rectus abdominis muscle is displayed.

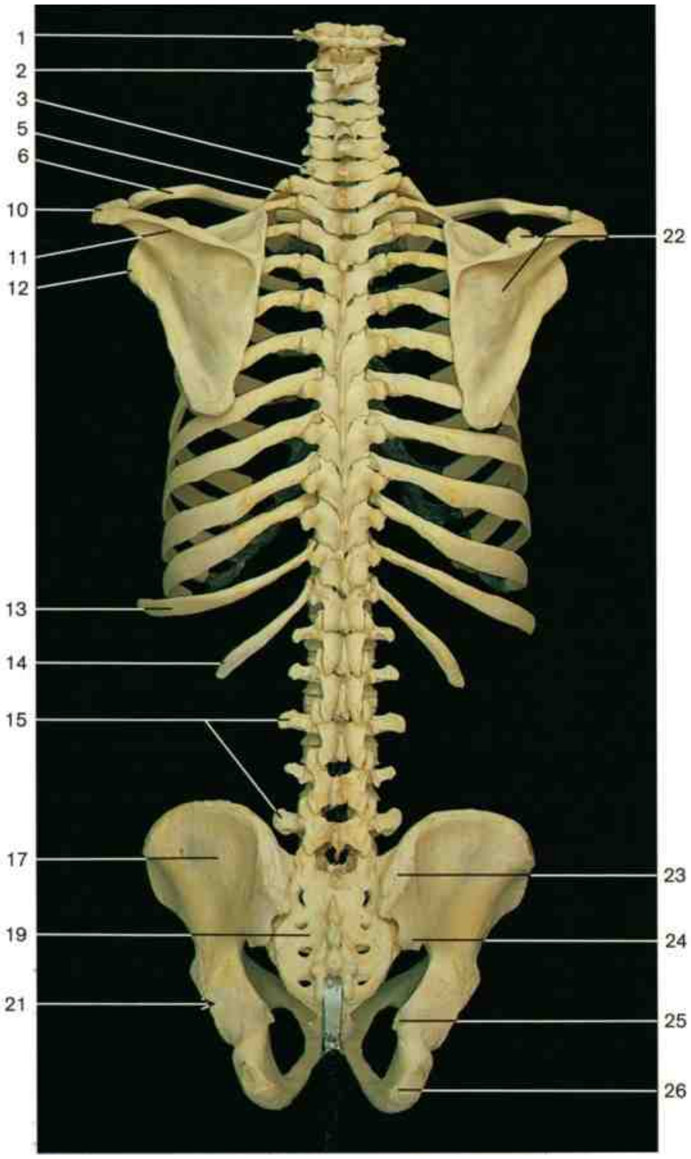


Organization of the thoracic and abdominal walls. The architecture of tendon fibers of the two abdominal oblique muscles in the rectus sheath is shown.

1	Clavicle
2	Pectoralis major muscle
3	Sternum
4	Linea alba
5	Anterior layer of rectus sheath
6	Umbilicus
7	Internal abdominal oblique muscle
8	Inguinal ligament
9	External abdominal oblique muscle

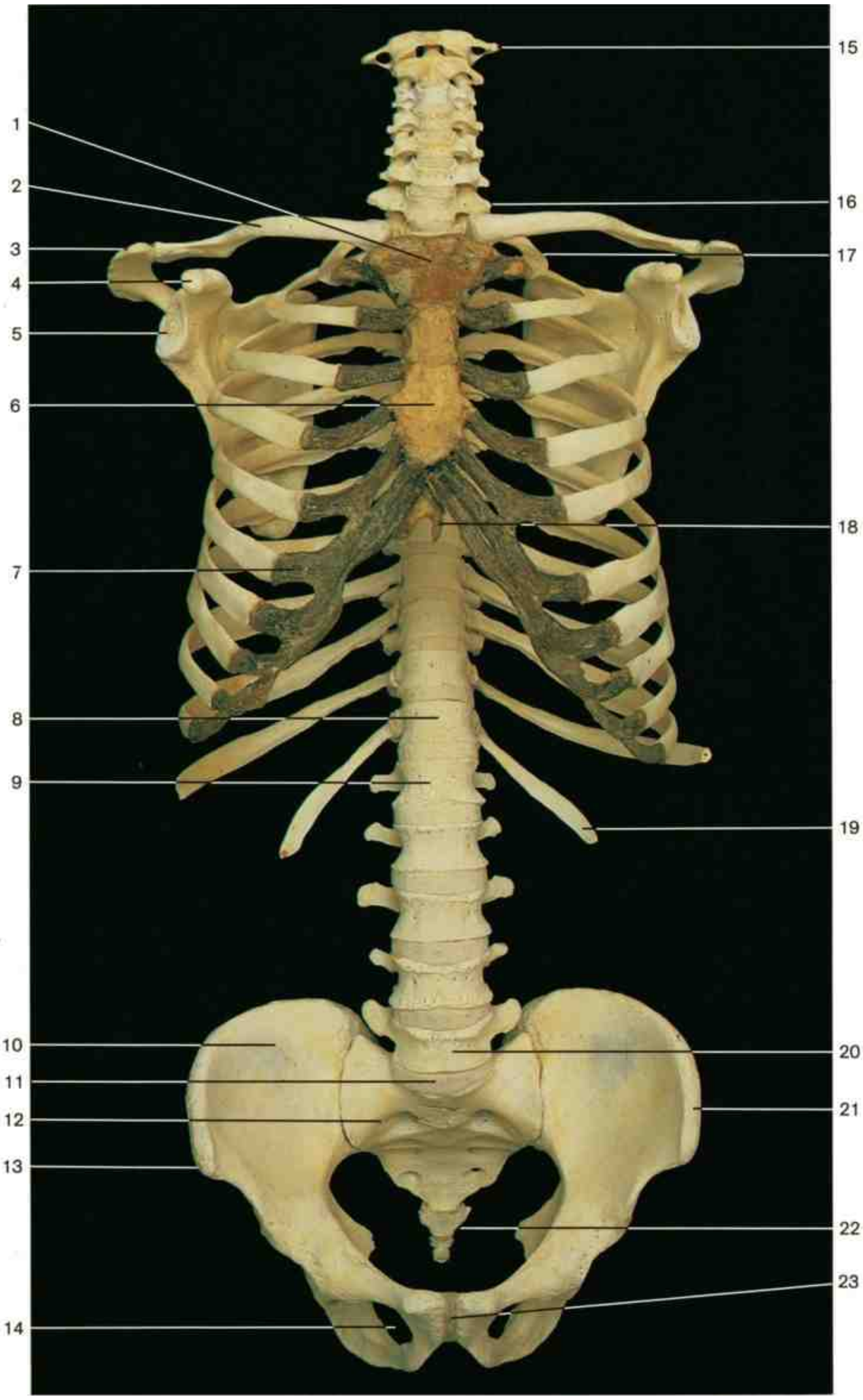


Median sagittal section through the vertebral column, head, and thorax of the adult.



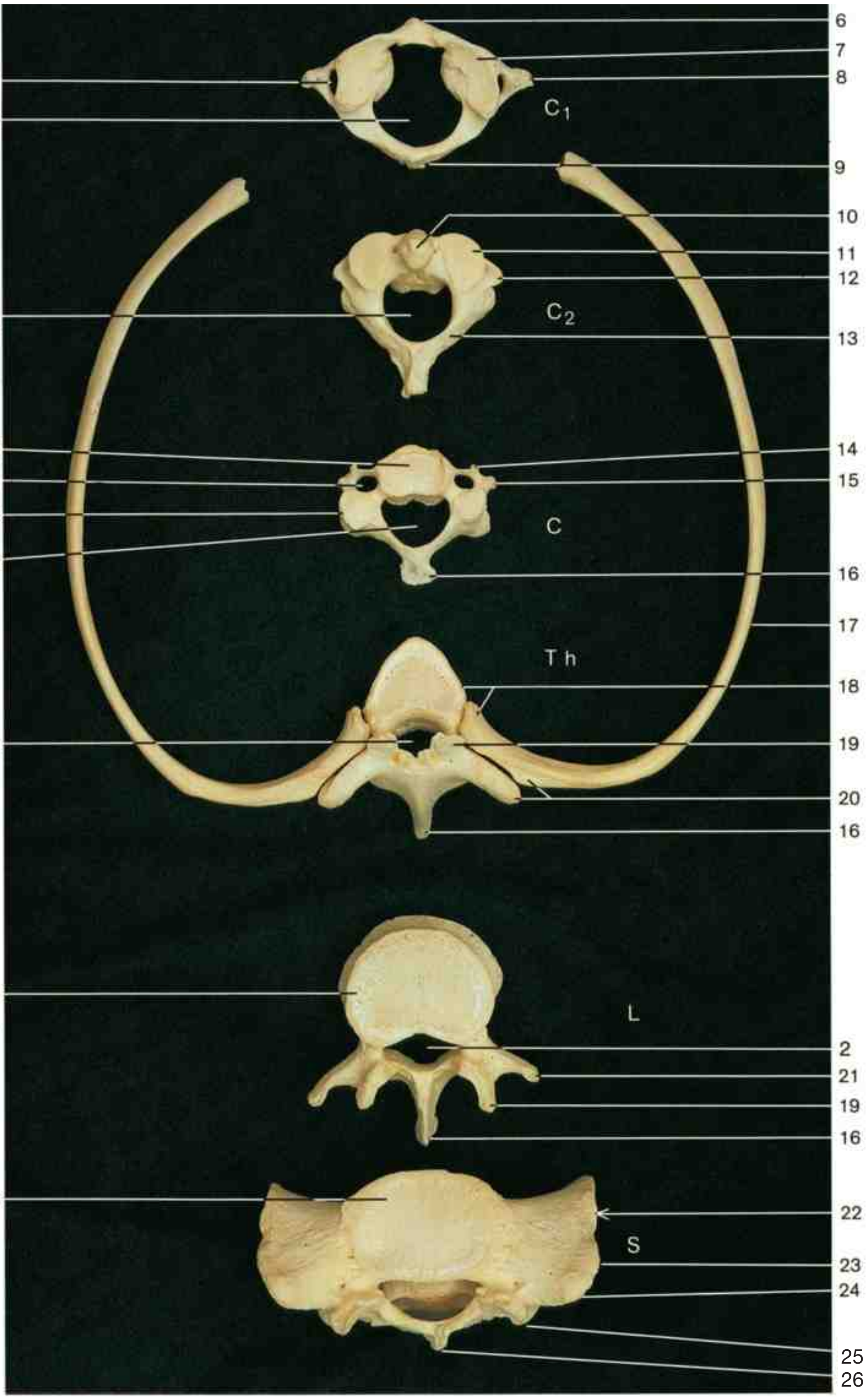
Skeleton of the trunk, vertebral column, thorax, and pelvis (posterior aspect).

1 Atlas
2 Axis
3 Seventh cervical vertebra (vertebra prominens)
4 Vertebral canal
5 First rib
6 Clavicle
7 Manubrium sterni
8 Body of sternum
9 Costal arch
10 Acromion
11 Spine of scapula
12 Glenoid cavity (lateral angle of scapula)
13 Eleventh rib
14 Twelfth rib
15 Lumbar vertebrae
16 Sacral promontory
17 Hip bone
18 Pubic symphysis
19 Sacrum
20 Obturator foramen
21 Acetabulum
22 Scapula with coracoid process
23 Posterior superior iliac spine
24 Posterior inferior iliac spine
25 Ischial spine
26 Ischial tuberosity



Skeleton of the trunk, vertebral column, pelvis, thorax, and shoulder girdle (anterior aspect).

1	Manubrium sterni
2	Clavicle
3	Acromion
4	Coracoid process
5	Glenoid cavity
6	Body of sternum
7	Costal cartilage
8	Body of the twelfth thoracic vertebra
9	Body of the first lumbar vertebra
10	Hip bone
11	Sacral promontory
12	Sacrum
13	Anterior superior iliac spine
14	Obturator foramen
15	Atlas
16	Seventh cervical vertebra
17	First rib
18	Xiphoid process
19	Twelfth rib
20	Body of the fifth lumbar vertebra
21	Iliac crest
22	Coccyx
23	Pubic symphysis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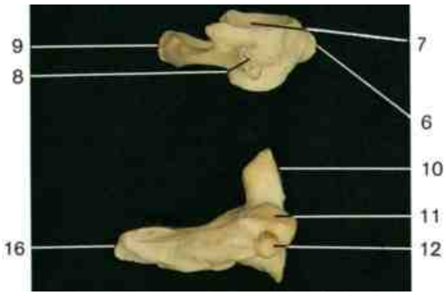
Representative vertebrae from each region of the vertebral column (superior aspect). From top to bottom: atlas (C_1), axis (C_2), cervical vertebra (C), thoracic vertebra (Th), lumbar vertebra (L), and sacrum (S).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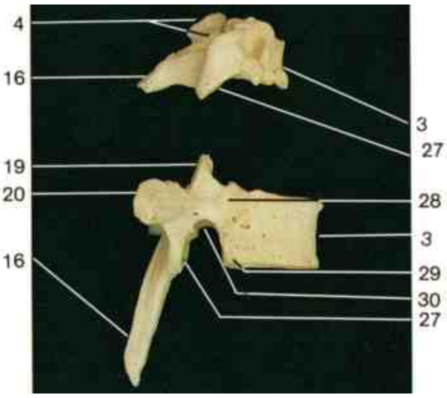
Atlas and axis.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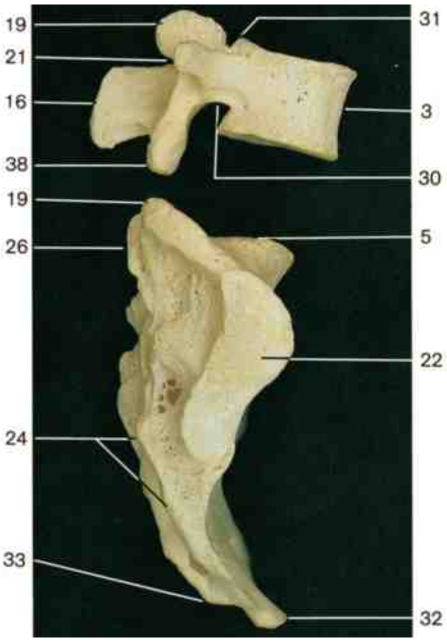
Typical cervical and thoracic vertebrae.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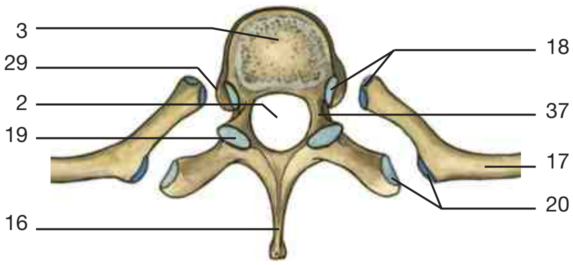
Typical lumbar vertebra and sacrum.

△
Representative vertebrae from each region of the vertebral column (lateral aspect, ventral surface on the right).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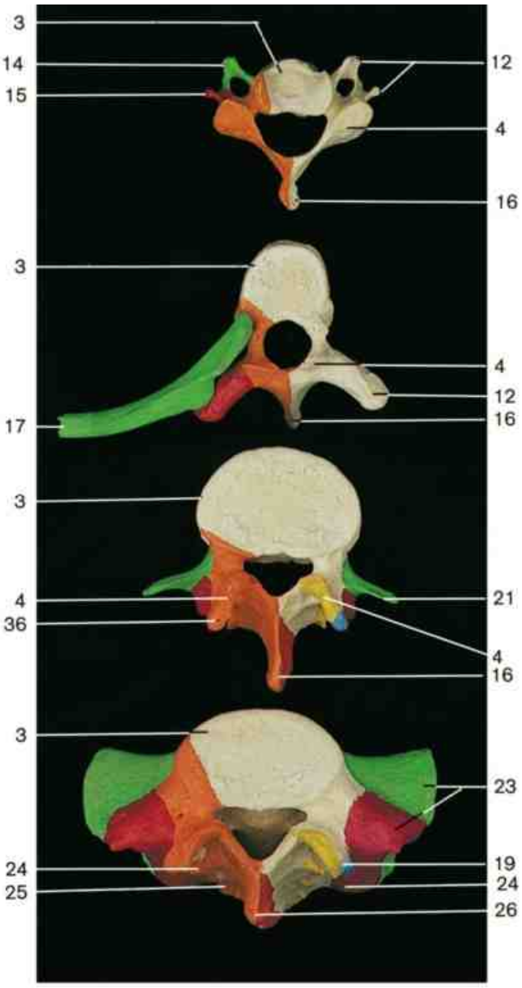
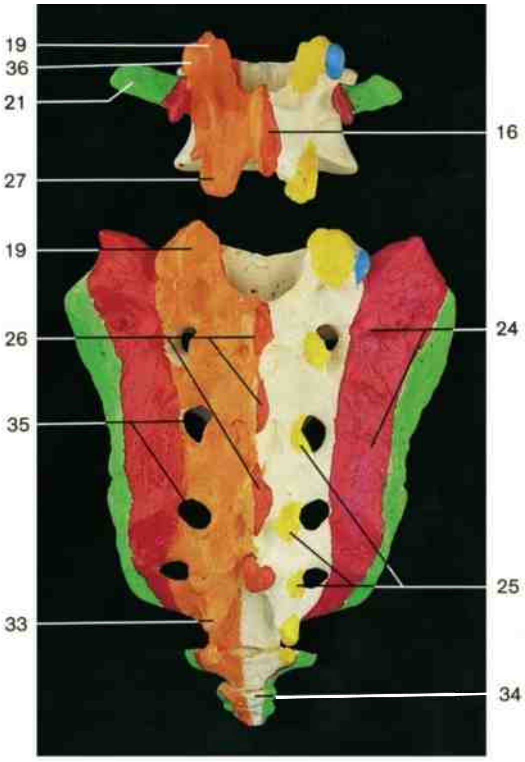
General organization of ribs and vertebrae (schematic drawing).



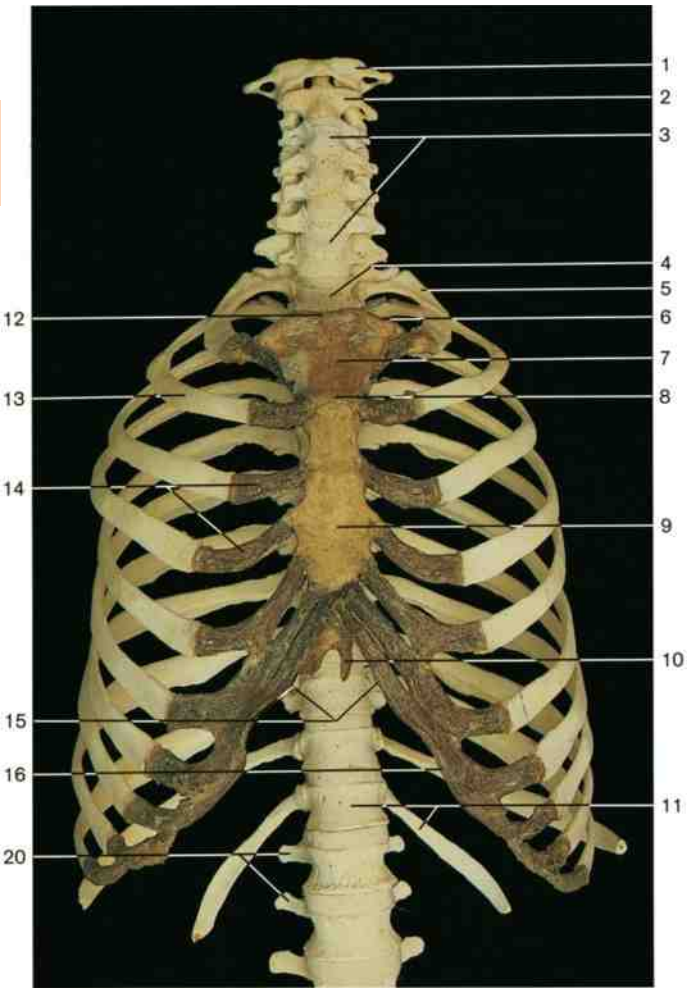
General characteristics of the vertebrae. Typical cervical, thoracic, and lumbar vertebrae and sacrum.



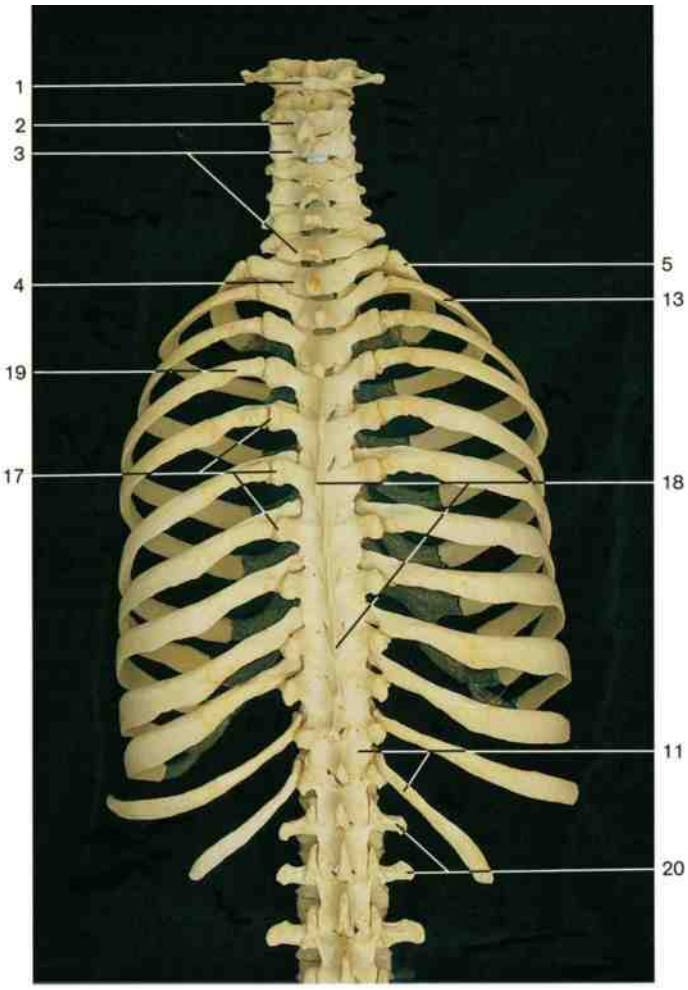
General characteristics of lumbar vertebrae and sacrum (posterior aspect).

Green = ribs or homologous processes
Red = muscular processes (transverse and spinous processes)
Orange = laminae and articular processes
Yellow and blue = articular facets

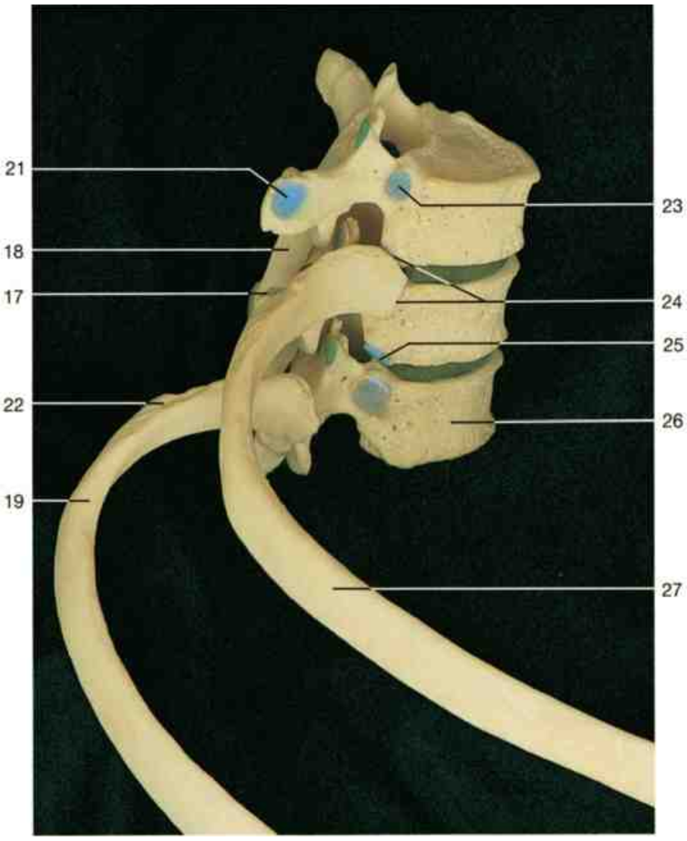
1 Foramen transversarium
2 Vertebral foramen
3 Body of vertebra
4 Superior articular facet
5 Base of sacrum
6 Anterior tubercle of atlas
7 Superior articular facet of atlas
8 Transverse process
9 Posterior tubercle of atlas
10 Dens of axis
11 Superior articular surface
12 Transverse process
13 Arch of vertebra
14 Anterior tubercle of transverse process
15 Posterior tubercle of transverse process
16 Spinous process
17 Shaft of rib
18 Body of vertebra and head of rib articulating with each other (costovertebral joint)
19 Superior articular process
20 Transverse process and tubercle of rib articulating with each other (costotransverse joint)
21 Costal process
22 Auricular surface
23 Lateral part of sacrum
24 Lateral sacral crest
25 Intermediate sacral crest
26 Median sacral crest
27 Inferior articular facet
28 Superior demifacet for head of rib
29 Inferior demifacet for head of rib
30 Inferior vertebral notch
31 Superior vertebral notch
32 Apex of the sacrum
33 Sacral cornu
34 Coccyx
35 Dorsal sacral foramina
36 Mamillary process
37 Pedicle
38 Inferior articular process



Skeleton of the thorax (anterior aspect).

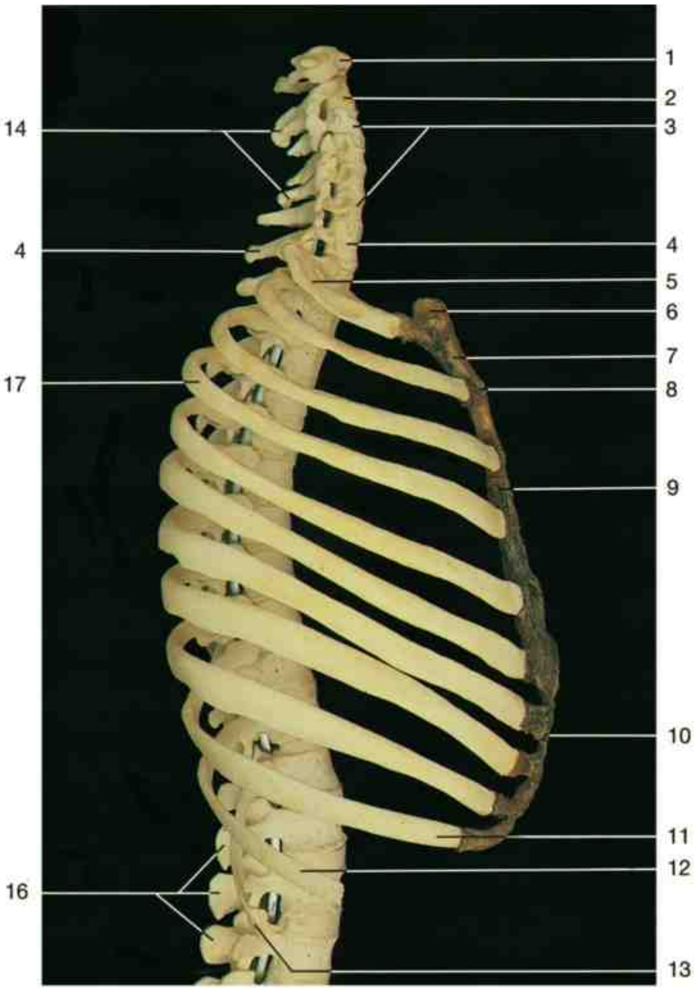


Skeleton of the thorax (posterior aspect).



Costovertebral articulation (right lateral aspect).

1	Atlas
2	Axis
3	Cervical vertebrae
4	First thoracic vertebra
5	First rib
6	Facet for clavicle and clavicular notch
7	Manubrium sterni
8	Sternal angle
9	Body of sternum
10	Xiphoid process
11	Twelfth thoracic vertebra and rib
12	Jugular notch
13	Second rib
14	Costal cartilages
15	Infrasternal angle
16	Costal arch
17	Costotransverse joints between the transverse processes of thoracic vertebra and the tubercles of the ribs
18	Spinous processes
19	Costal angle
20	Costal processes of lumbar vertebrae
21	Facet for articulation with rib
22	Tubercle of rib
23	Superior facet for articulation with head of rib
24	Articulation of head of rib with two vertebrae
25	Inferior facet for articulation with head of rib
26	Body of thoracic vertebra
27	Body or shaft of rib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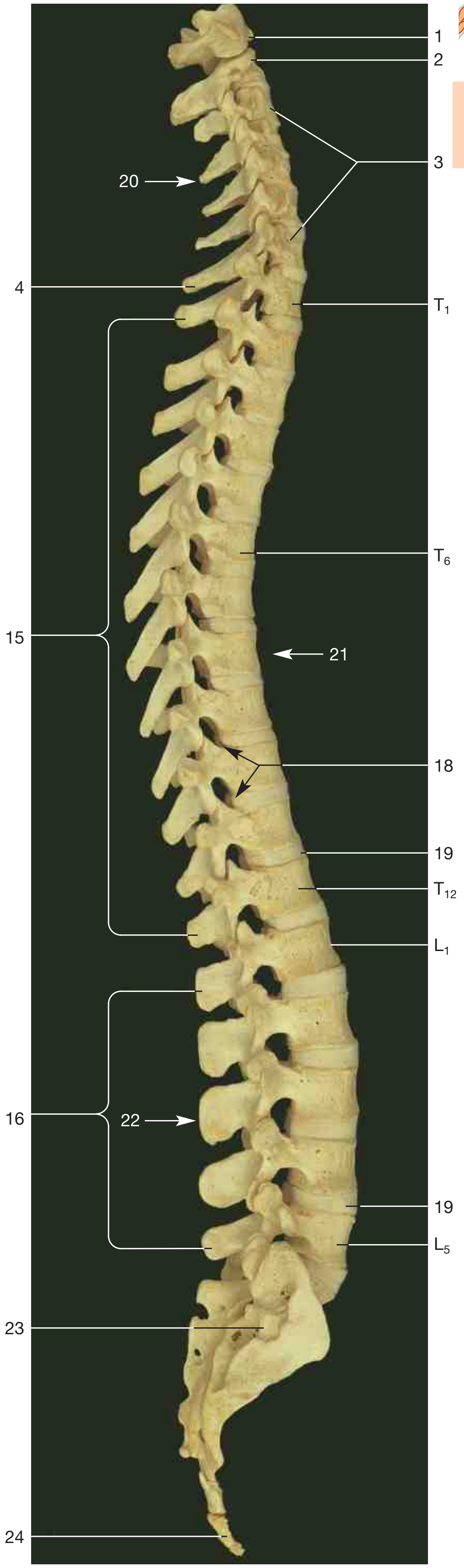
Skeleton of the thorax (right lateral aspect).

1 Atlas
2 Axis
3 Cervical vertebrae
4 Seventh cervical vertebra (vertebra prominens)
5 First rib
6 Facet for clavicle
7 Manubrium sterni
8 Sternal angle
9 Body of sternum
10 Costal arch
11 Tenth rib
12 Eleventh rib
13 Twelfth rib
14 Spinous processes of cervical vertebrae
15 Spinous processes of thoracic vertebrae
16 Spinous processes of lumbar vertebrae
17 Costal angle
18 Intervertebral foramina
19 Intervertebral discs
20 Cervical curvature
21 Thoracic curvature
22 Lumbar curvature
23 Sacrum
24 Coccyx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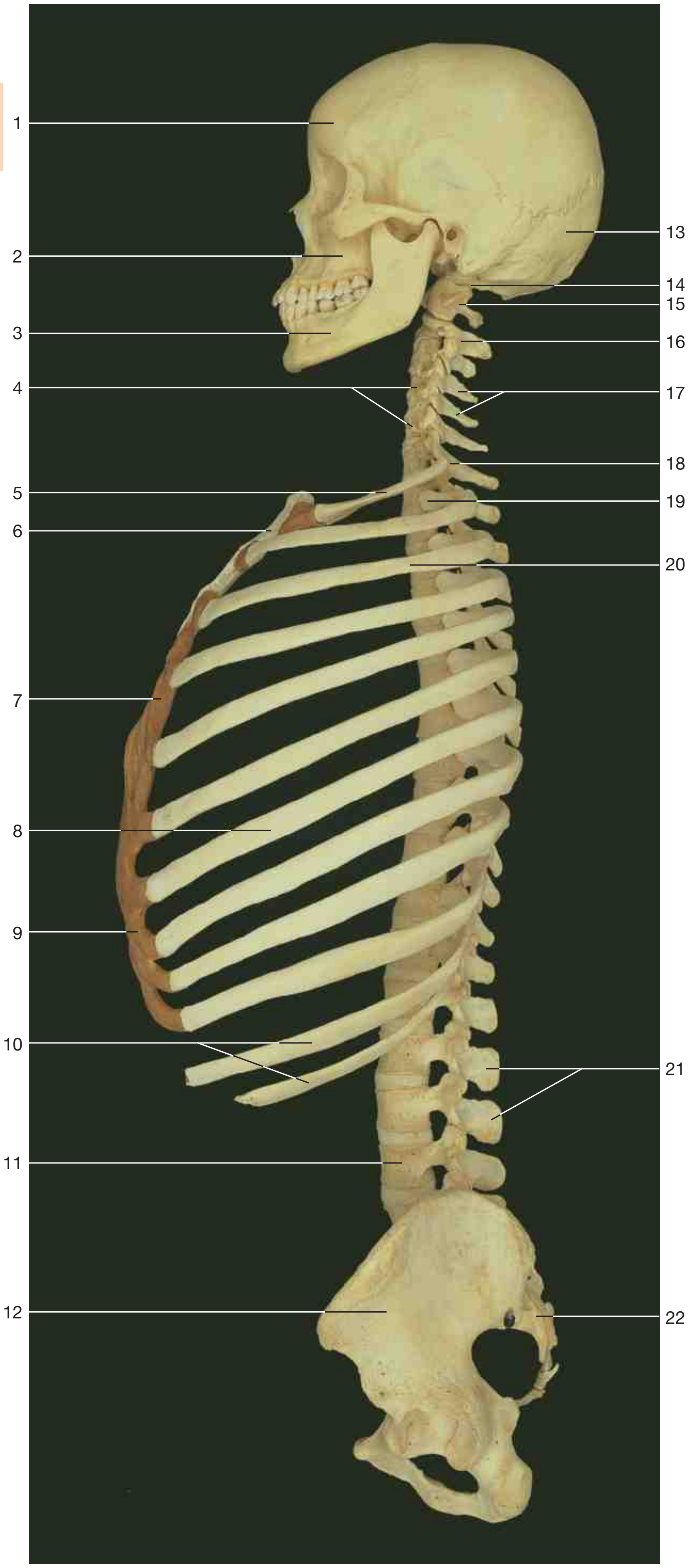
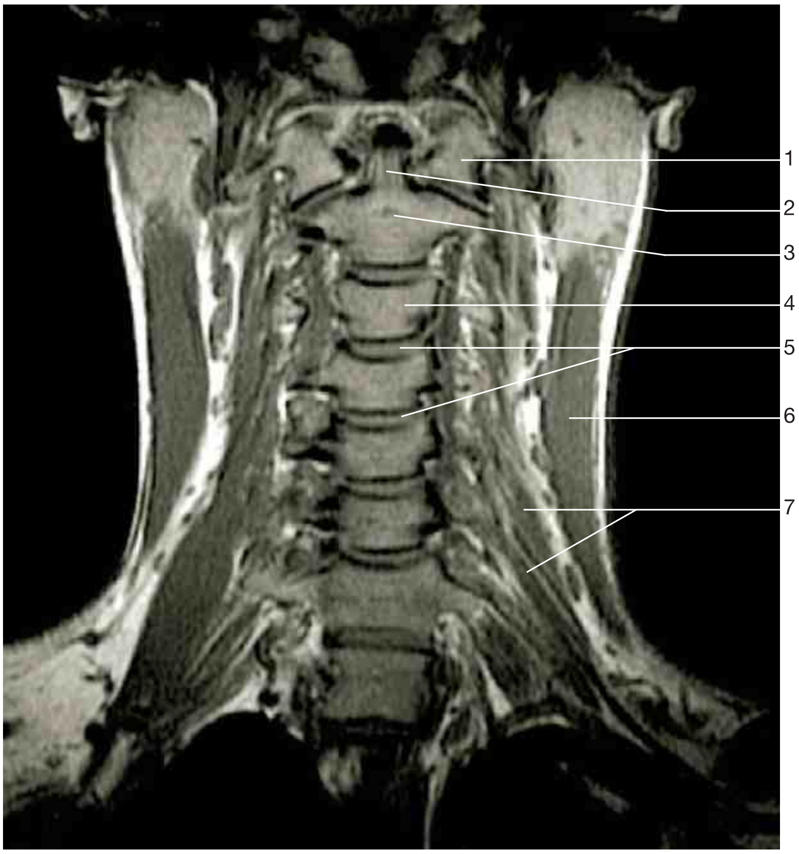
Vertebral column (right lateral aspect).



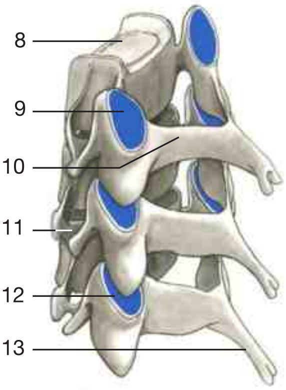
1 Frontal bone
2 Maxilla
3 Mandible
4 Bodies of cervical vertebrae
5 First rib
6 Manubrium of sternum
7 Sternum (corpus sterni)
8 Seventh rib (last of the true ribs)
9 Costal arch (arcus costalis)
10 Floating ribs (costae fluctuantes)
11 Body of fourth lumbar vertebra
12 Pelvis
13 Occipital bone
14 Atlanto-occipital joint
15 Atlas
16 Axis
17 Spinous processes of cervical vertebrae (C_4, C_5)
18 Costotransverse joint of first rib
19 Head of second rib
20 Third rib
21 Spinous processes of lumbar vertebrae (L_2, L_3)
22 Sacrum

Vertebral column and thorax in connection with head and pelvis (lateral aspect).

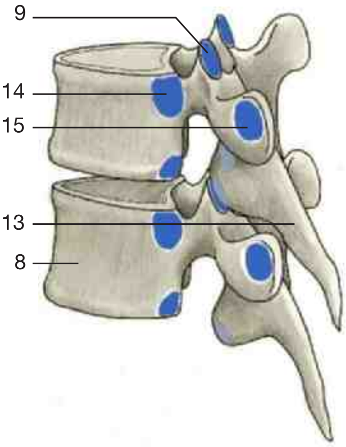
1	Atlas
2	Dens of axis
3	Axis
4	Body of cervical vertebra
5	Intervertebral discs
6	Sternocleidomastoid muscle
7	Scalenus muscles
8	Body of vertebra
9	Superior articular facet
10	Vertebral arch
11	Transverse process of vertebra
12	Zygapophysial joint
13	Spinous process
14	Articular facet of costovertebral joint
15	Transverse process with articular facet of costotransverse joint
16	Costal process of lumbar vertebra
17	Sacrum
18	Median sacral crest
19	Dorsal sacral foramina
20	Coccyx



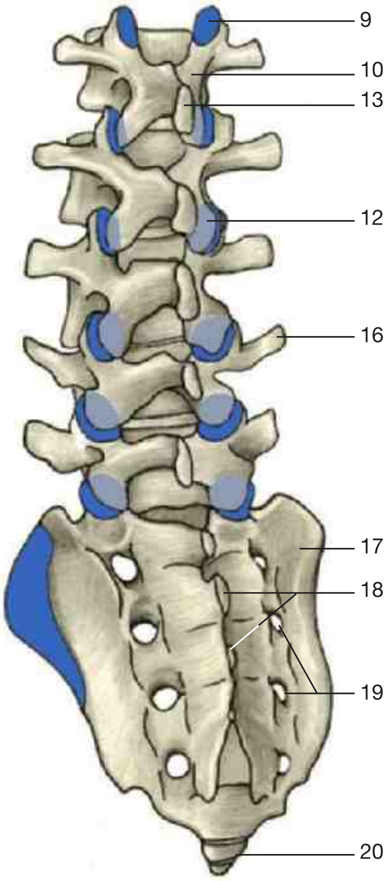
Coronal section through the neck at the level of the cervical vertebrae (MRI scan, courtesy of Prof. Heuck, Munich).



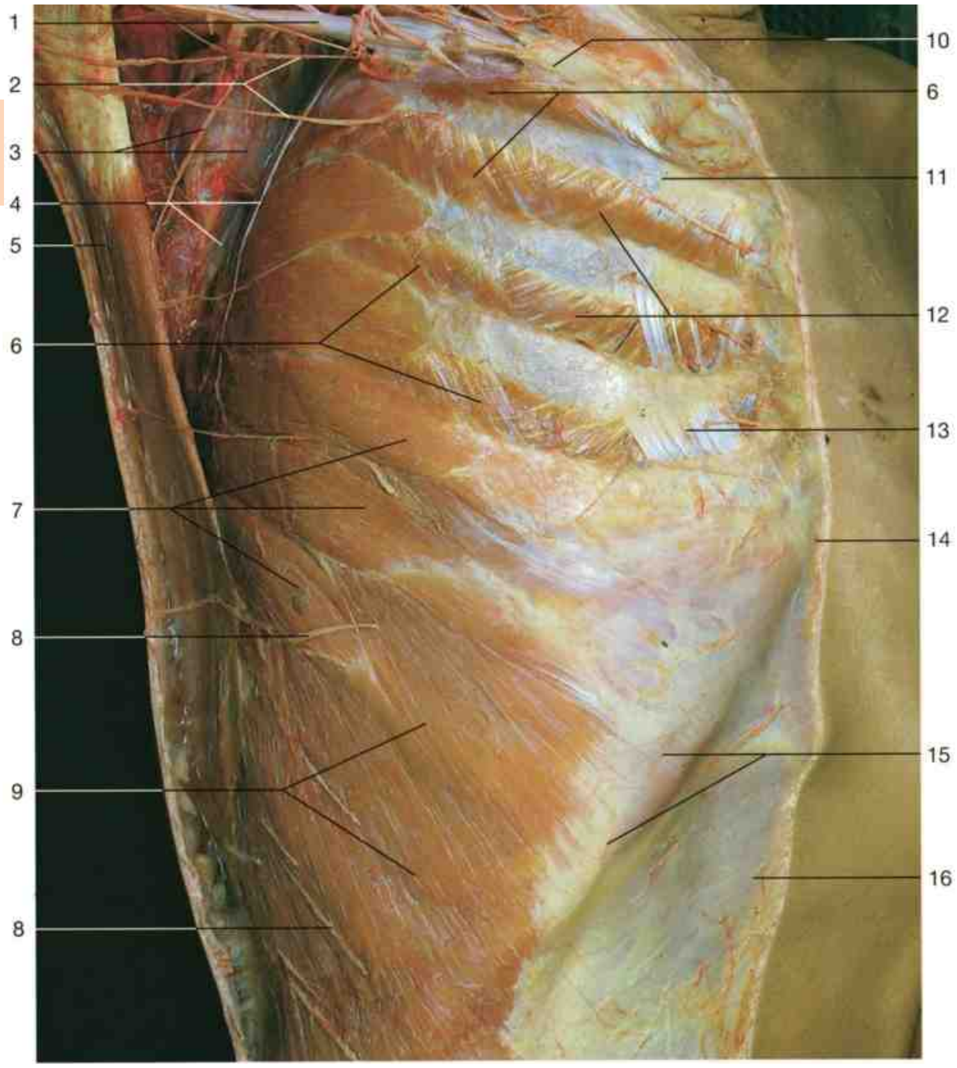
Cervical vertebrae (lateral aspect, articular facets = blue).



Thoracic vertebrae (lateral aspect, articular facets = blue).

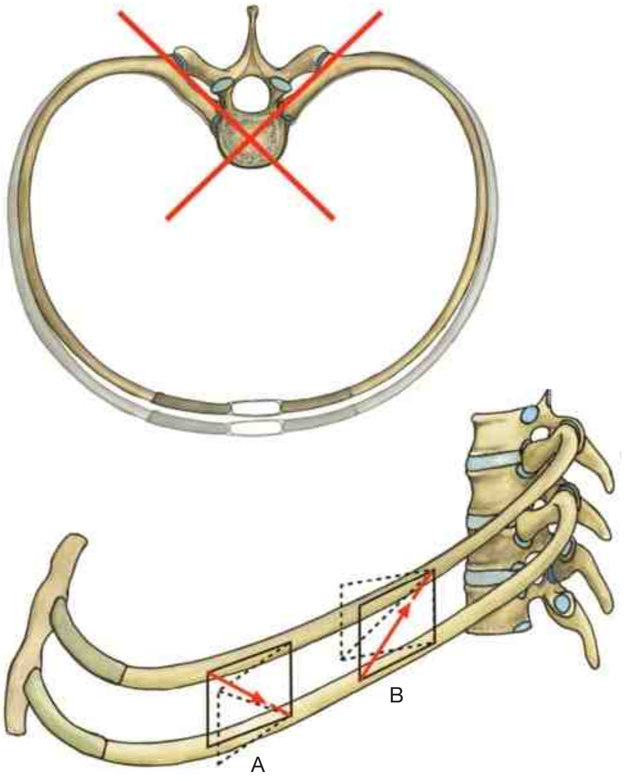


Lumbar vertebrae with sacrum and coccyx (posterior aspect, articular facets = blue).

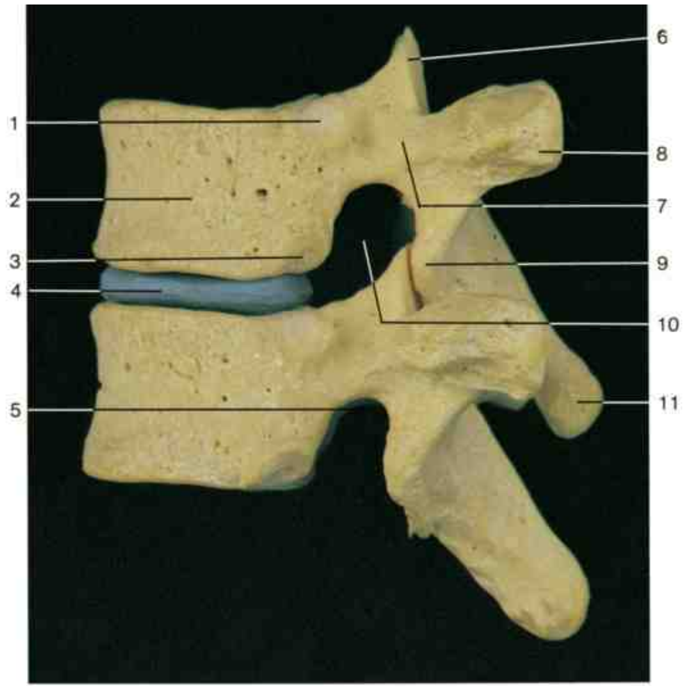


1 Axillary vein
2 Intercostobrachial nerves
3 Subscapularis muscle and thoracodorsal nerve
4 Long thoracic nerve, lateral thoracic artery and vein
5 Latissimus dorsi muscle
6 External intercostal muscles
7 Serratus anterior muscle
8 Lateral cutaneous branches of intercostal nerves
9 External abdominal oblique muscle
10 Clavicle (divided)
11 Second rib (costochondral junction)
12 Internal intercostal muscles
13 External intercostal membrane
14 Position of xiphoid process
15 Costal arch or margin
16 Anterior layer of rectus sheath

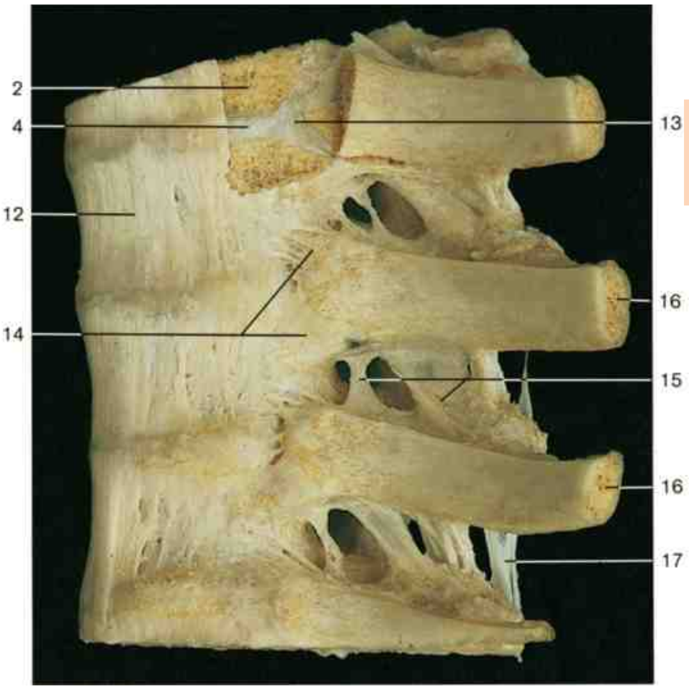
Muscles of the thorax, superficial layer (lateral aspect). Upper limb elevated. Pectoralis major and minor muscles have been removed.



Effect of intercostal muscles on the costovertebral and costotransverse joints. Axes of movement indicated by red lines; direction of movements indicated by red arrows.
A = action of internal intercostal muscles (expiration);
B = action of external intercostal muscles (inspiration).



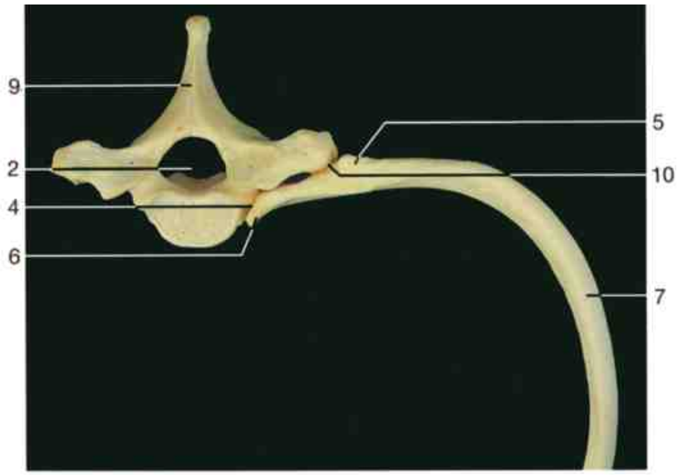
Two thoracic vertebrae (left lateral aspect).



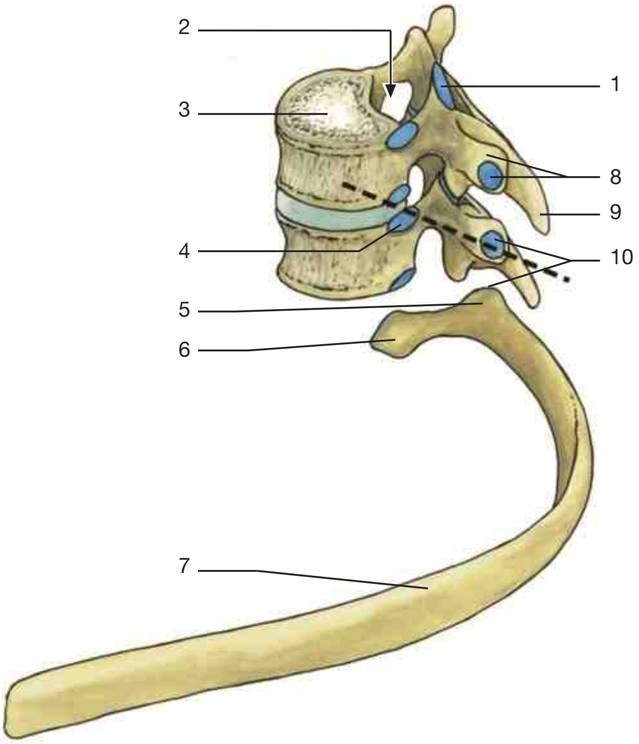
Ligaments of thoracic vertebrae and costovertebral joints (left antero-lateral aspect). In the upper joint, most of the radiate ligament and the anterior part of the head of the rib have been removed to expose the two joint cavities and the interposed intra-articular ligament.

1 Superior demifacet for head of rib
2 Body of vertebra
3 Inferior demifacet for head of rib
4 Intervertebral disc
5 Inferior vertebral notch
6 Superior articular facet and superior articular process
7 Pedicle
8 Transverse process and facet for tubercle of rib
9 Inferior articular process
10 Intervertebral foramen
11 Spinous process
12 Anterior longitudinal ligament
13 Intra-articular ligament
14 Radiate ligament
15 Superior costotransverse ligament
16 Body of rib
17 Intertransverse ligament

↳ entre processos transversos

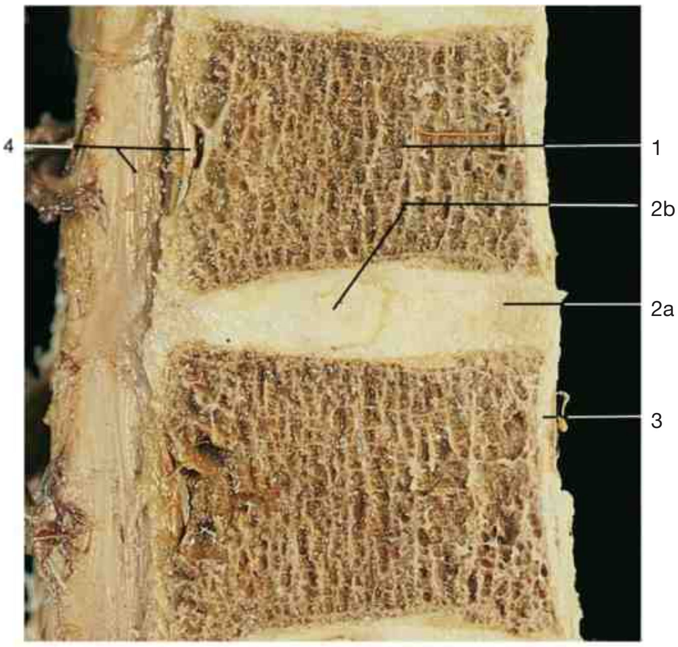


Location of costovertebral joints (superior aspect).

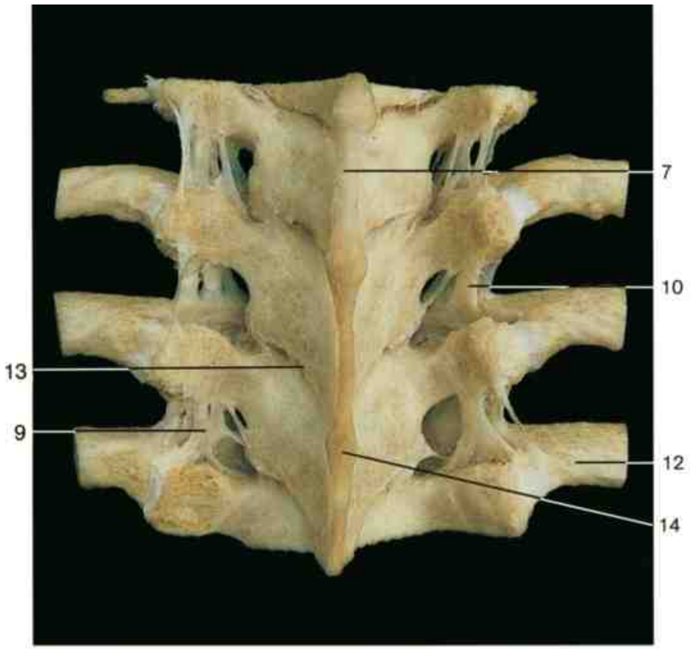


Costovertebral joints (schematic drawing). Two thoracic vertebrae with an articulating rib (separated). Axis of movement indicated by dashed line. Blue = articular facets.

1 Superior articular process
2 Vertebral canal
3 Body of thoracic vertebra
4 Costovertebral joint (articular facets)
5 Tubercle of rib
6 Head of rib
7 Shaft or body of rib
8 Transverse process with articular facet
9 Spinous process
10 Costotransverse joint (articular facets)



Median-sagittal section of the bodies of the vertebrae, showing the **intervertebral discs,** each of which consists of an outer laminated portion and an inner core.

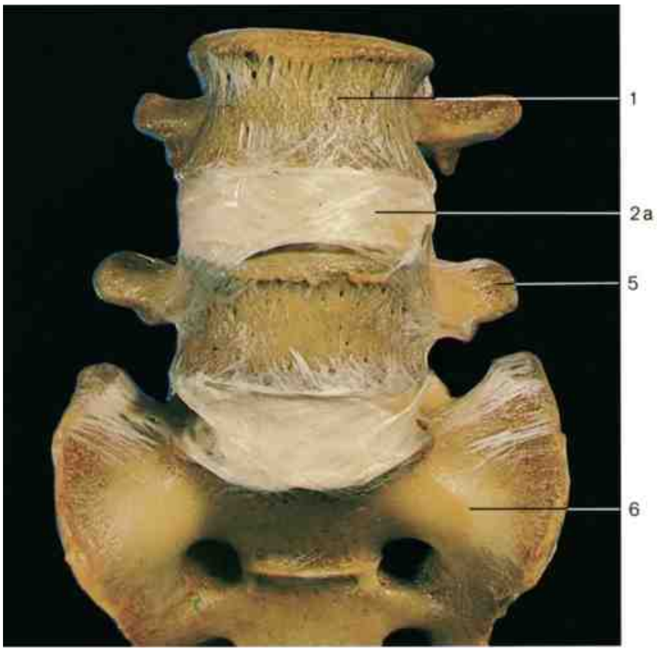


Ligaments of the vertebral column (dorsal aspect).

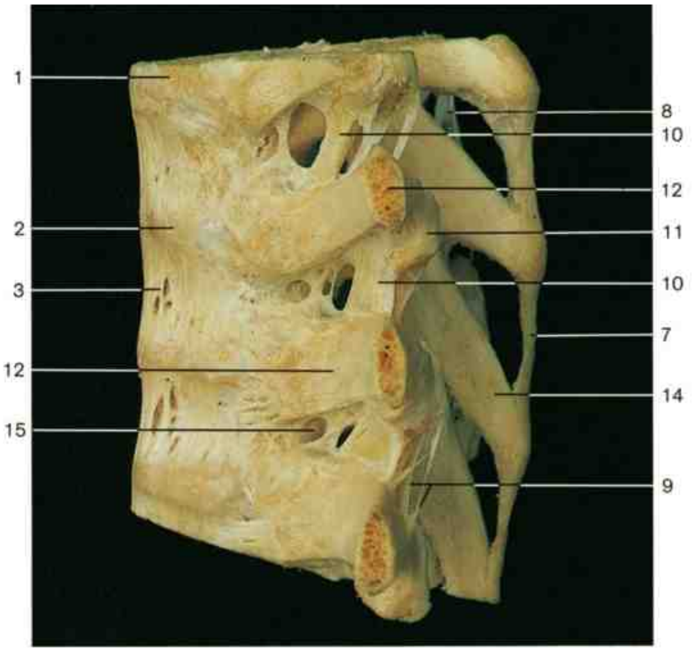
1 Body of vertebra
2 Intervertebral disc
  a Outer portion (anulus fibrosus)
  b Inner core (nucleus pulposus)
3 Anterior longitudinal ligament
4 Posterior longitudinal ligament and spinal dura mater
5 Costal process of lumbar vertebra
6 Sacrum
7 Supraspinous ligament

↳ Supraespinal (entre as pontas dos P.E.)

8 Interspinous ligament
9 Intertransverse ligament
10 Superior costotransverse ligament
11 Transverse process of thoracic vertebra
12 Rib
13 Ligamentum flavum
14 Spinous process
15 Intervertebral foramen



The two caudal lumbar vertebrae and the sacrum with their intervertebral discs (anterior aspect). Anterior longitudinal ligament removed.

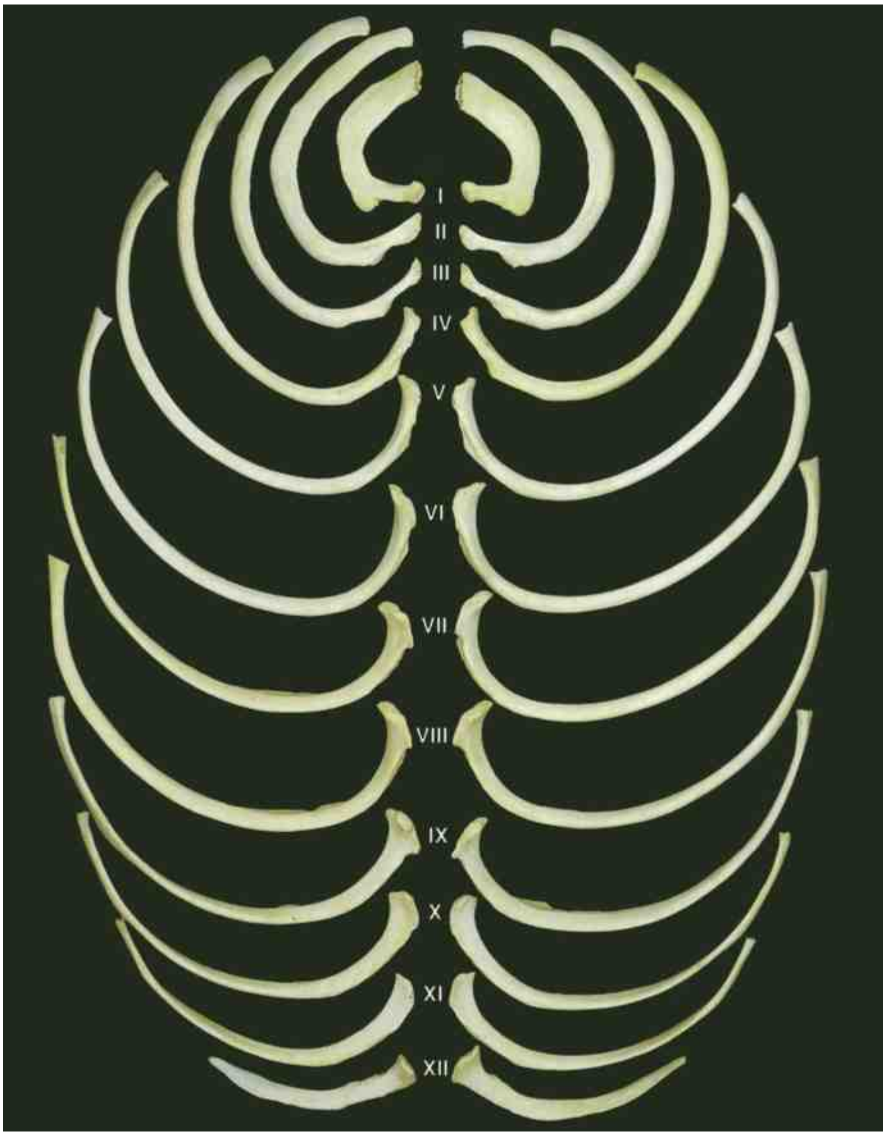


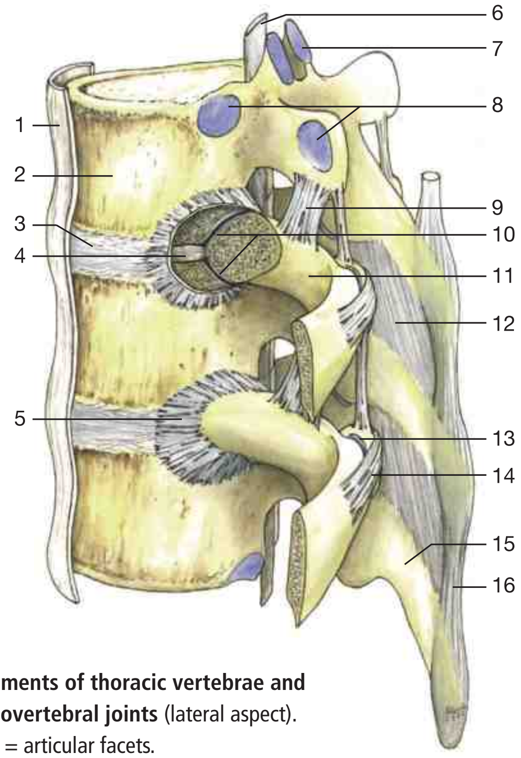
Ligaments of the vertebral column, thoracic part (left lateral aspect).

Disarticulated thorax skeleton. ▷
The twelve ribs (I–XII) are arranged in a craniocaudal direction.

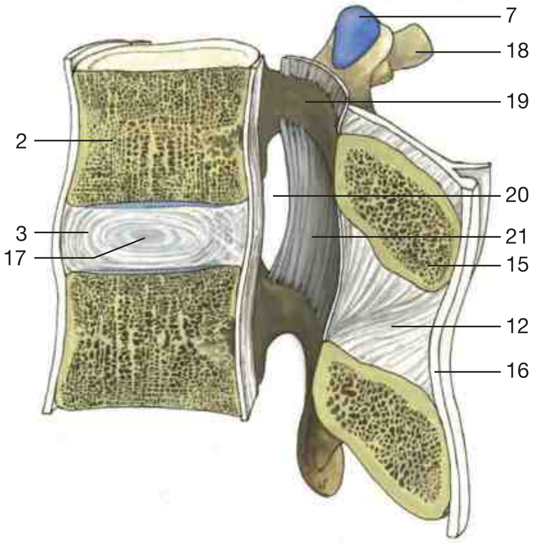
1	Anterior longitudinal ligament
2	Body of vertebra
3	Intervertebral disc
4	Intra-articular ligament
5	Radiate ligament
6	Posterior longitudinal ligament
7	Superior articular facet
8	Articular facets of costovertebral joints
9	Superior costotransverse ligament
10	Costovertebral joint
11	Rib
12	Interspinal ligament
13	Costotransverse joint
14	Lateral costotransverse ligament
15	Spinous process
16	Supraspinal ligament
17	Nucleus pulposus
18	Costal process
19	Vertebral arch
20	Intervertebral foramen
21	Intertransverse ligament

▽

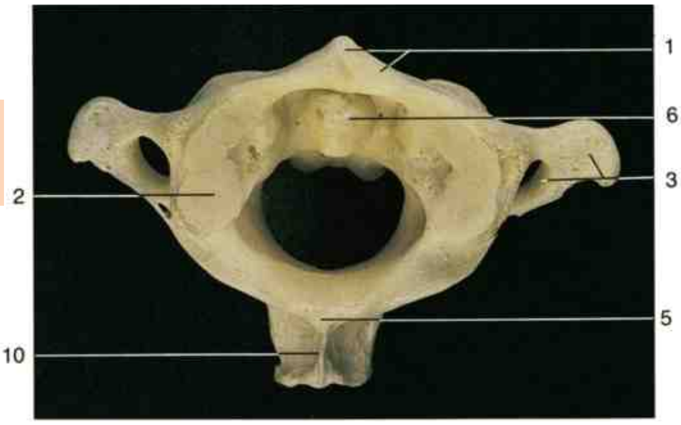




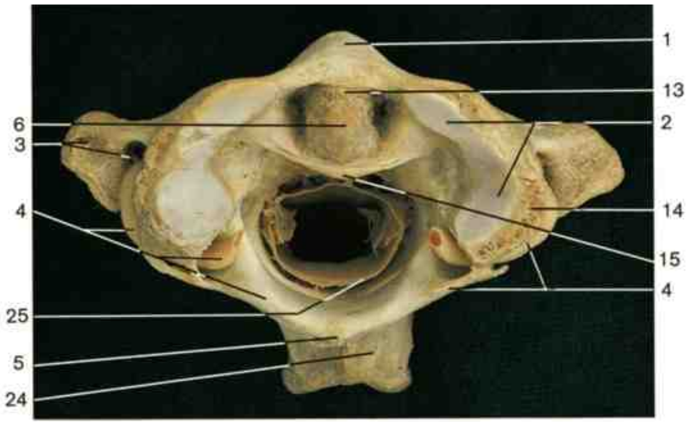
Ligaments of thoracic vertebrae and costovertebral joints (lateral aspect). Blue = articular facets.



Median-sagittal section of two lumbar vertebrae showing ligaments and vertebral discs.



Atlas and axis (from above).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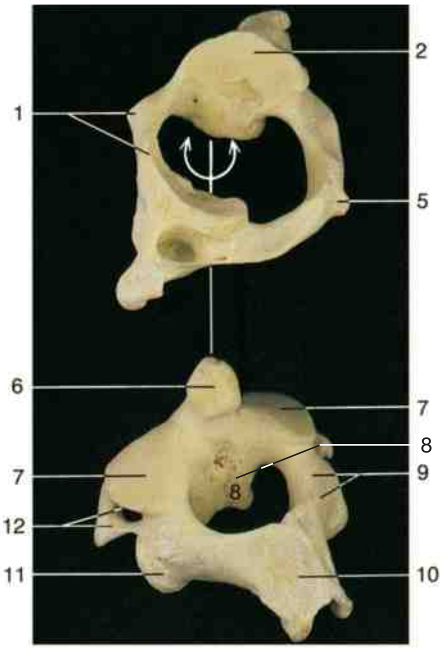
Median atlanto-axial joint and transverse ligament of atlas (from above). Dens of axis partly severed.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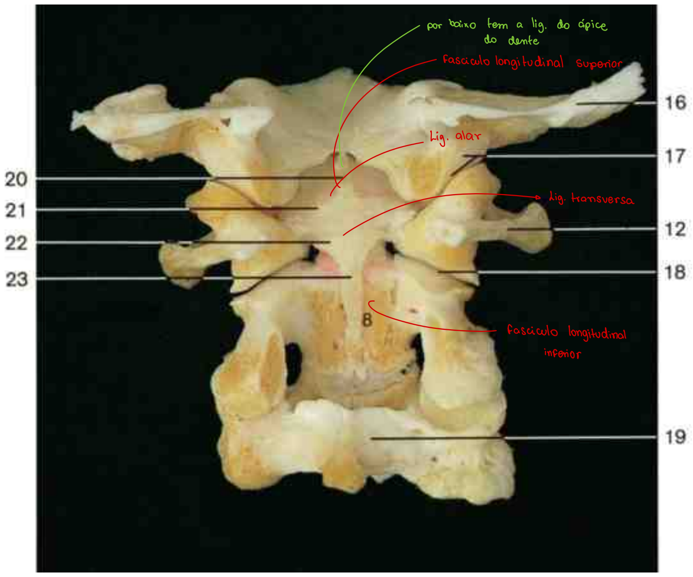
Atlas and axis. Left oblique postero-lateral aspect, demonstrating the articulation of the dens of axis with atlas (cf. arrows).

1 Anterior arch of atlas with anterior tubercle
2 Superior articular facet of atlas
3 Foramen transversarium and transverse process
4 Posterior arch of atlas and vertebral artery
5 Posterior tubercle of atlas
6 Dens of axis
7 Superior articular surface of axis
8 Body of axis
9 Pedicle and lamina of axis
10 Spinous process
11 Inferior articular process
12 Transverse process and foramen transversarium of axis
13 Median atlanto-axial joint (anterior part)
14 Articular capsule of atlanto-occipital joint
15 Transverse ligament of atlas
16 Occipital bone
17 Atlanto-occipital joint
18 Lateral atlanto-axial joint
19 Third cervical vertebra
20 Superior longitudinal band of cruciform ligament
21 Alar ligaments
22 Transverse ligament of atlas
23 Inferior longitudinal band of cruciform ligament
24 Spinous process of axis
25 Dura mater
26 Occipital bone


por baixo tem a lig. do ápice do dente
fasciculo longitudinal superior
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Lig. alar
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lig. transversa
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fasciculo longitudinal inferior
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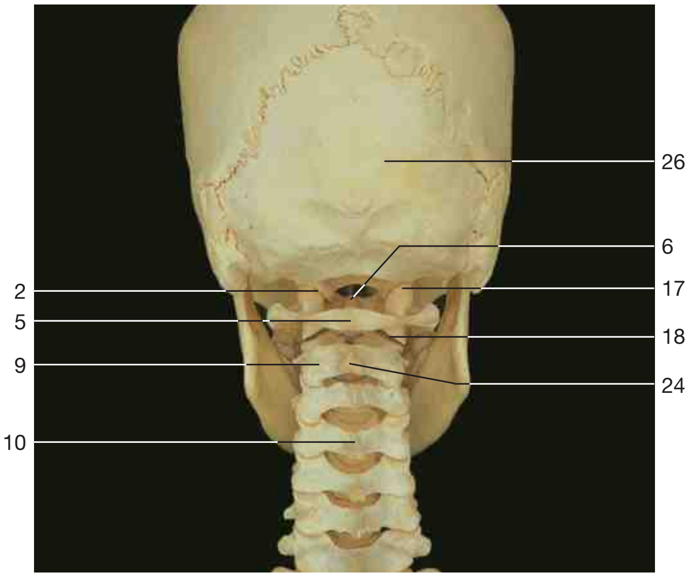
Atlanto-occipital and atlanto-axial joints (posterior aspect). Posterior part of occipital bone, posterior arch of atlas, and axis have been removed to show the cruciform ligament.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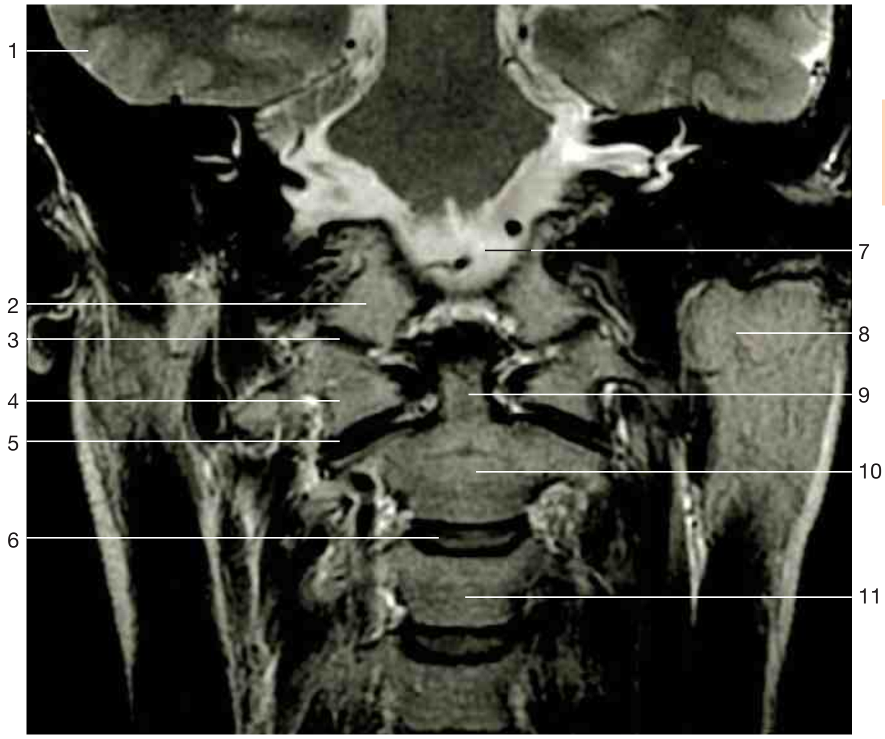
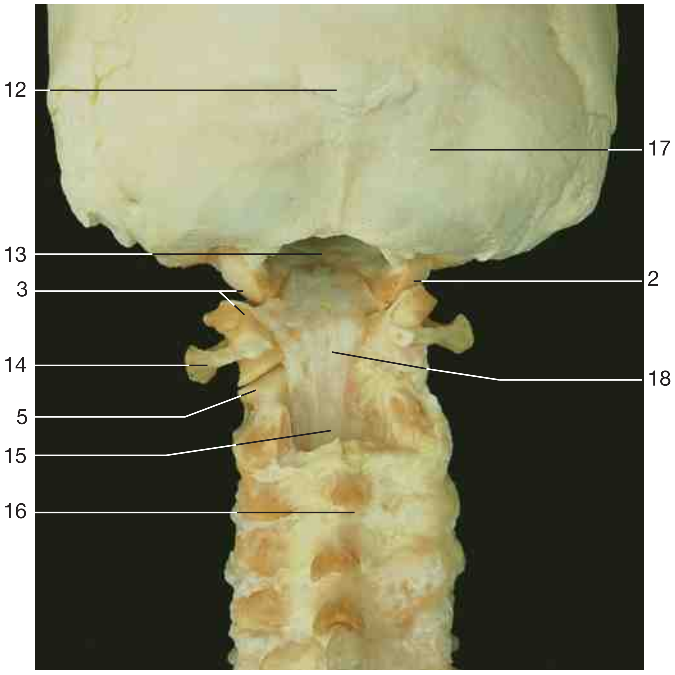
Head and cervical spine (posterior aspect). Bones of atlanto-occipital and atlanto-axial joints.

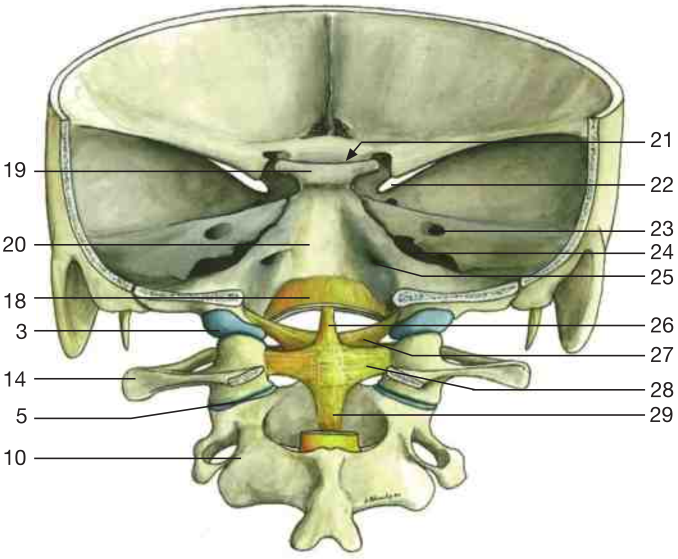
1 Cerebellum
2 Occipital condyle
3 Atlanto-occipital joint
4 Atlas
5 Lateral atlanto-axial joint
6 Intervertebral disc
7 Cistern of pons
8 Head of mandible
9 Dens of axis
10 Axis
11 Body of cervical vertebra (C_3)
12 External occipital protuberance
13 Foramen magnum
14 Transverse process of atlas
15 Posterior longitudinal ligament
16 Spinous process of cervical vertebra
17 Occipital bone
18 Membrana tectoria
19 Dorsum sellae
20 Clivus
21 Sella turcica
22 Superior orbital fissure
23 Internal acoustic meatus
24 Jugular foramen
25 Hypoglossal canal
26 Superior longitudinal band of cruciform ligament
27 Alar ligaments
28 Transverse ligament of atlas
29 Inferior longitudinal band of cruciform ligament



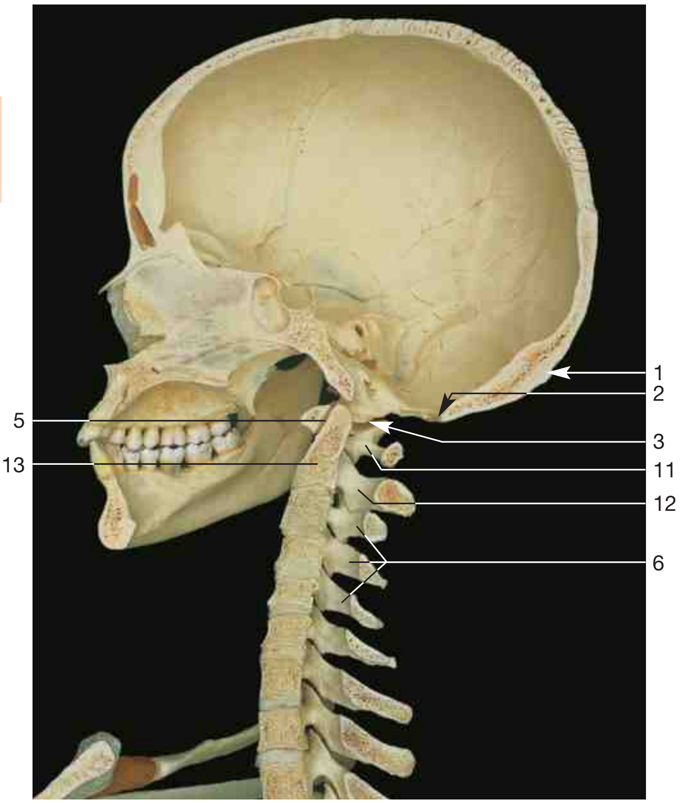
Coronal section of the neck at the level of dens of axis (MRI scan, courtesy of Prof. Heuck, Munich).



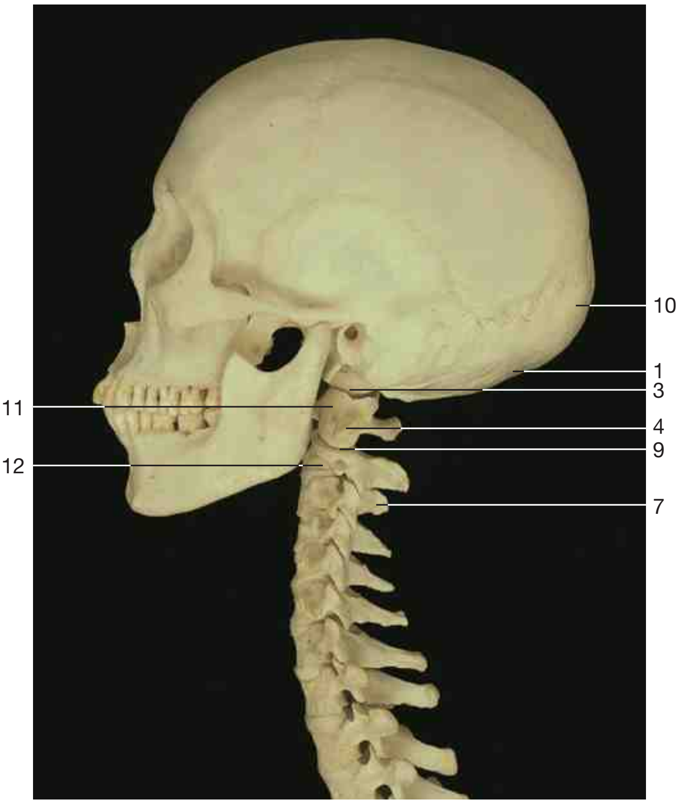
Cervical vertebral column and skull with ligaments (posterior aspect). Posterior arches of atlas and axis removed to show the membrana tectoria.



Atlanto-occipital and atlanto-axial joints with ligaments (posterior aspect). Posterior part of occipital bone and posterior arch of atlas have been removed to show the cruciform ligament.

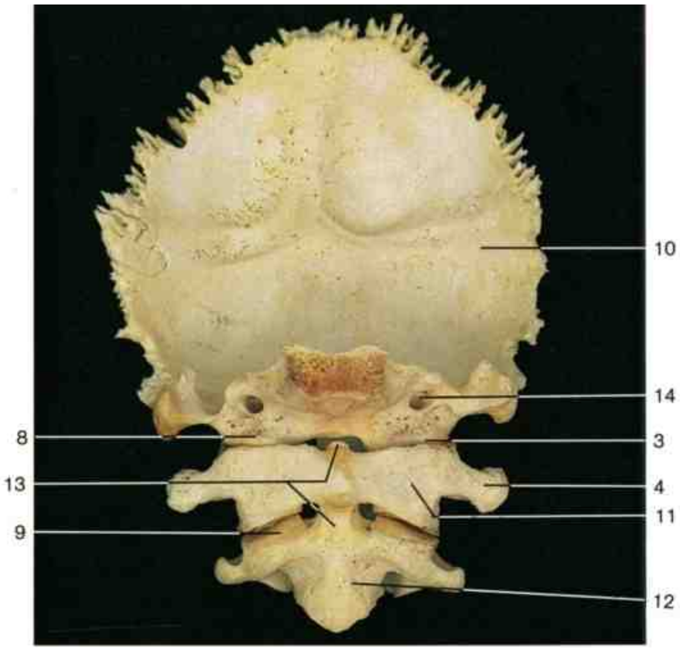


Cervical vertebral column in relation to the head (midsagittal section, medial aspect).

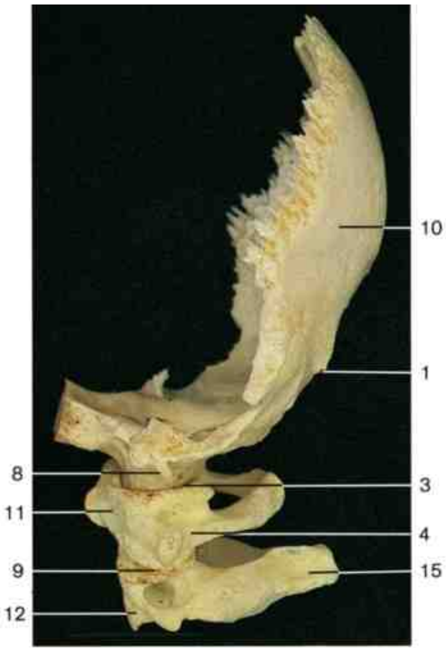


Atlas and axis in relation to the head (lateral aspect).

1	External occipital protuberance
2	Foramen magnum
3	Atlanto-occipital joint
4	Transverse process of atlas
5	Median atlanto-axial joint
6	Vertebral canal
7	Spinous process of third cervical vertebra
8	Occipital condyle
9	Lateral atlanto-axial joint
10	Occipital bone
11	Atlas
12	Axis
13	Dens of axis
14	Hypoglossal canal
15	Spinous process of axis

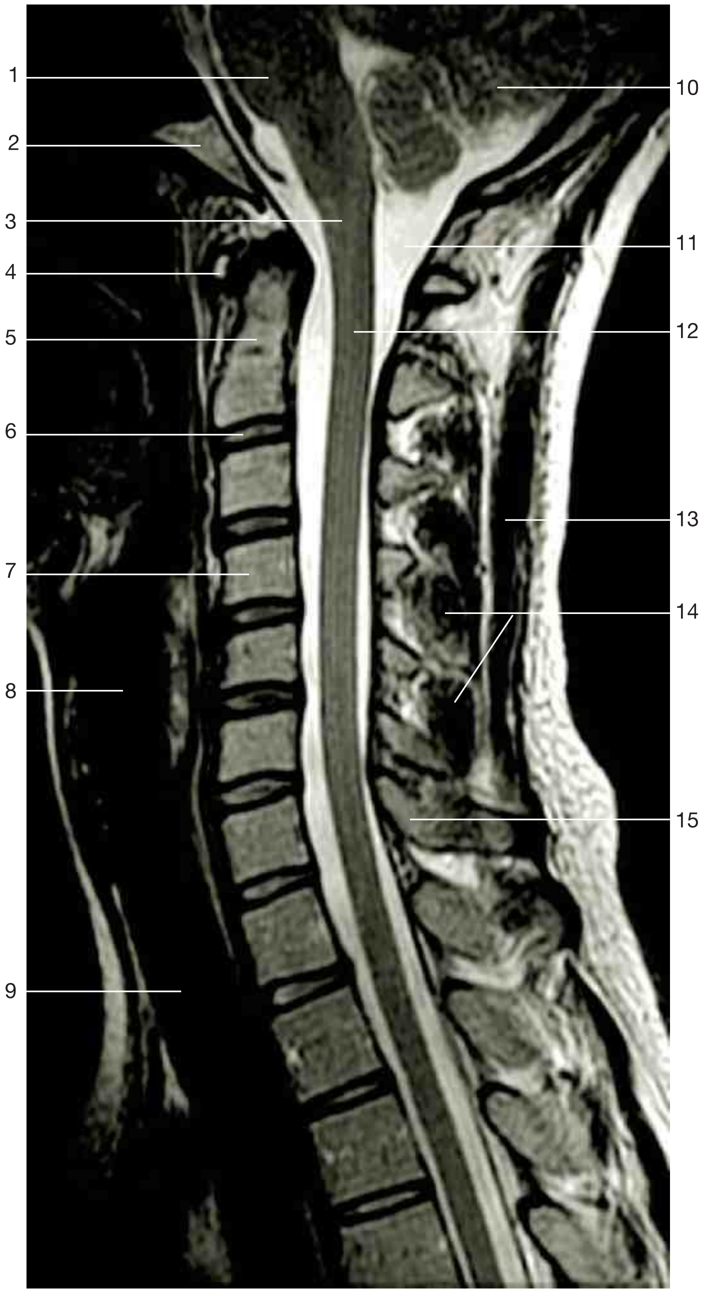


Occipital bone, atlas, and axis (anterior aspect).

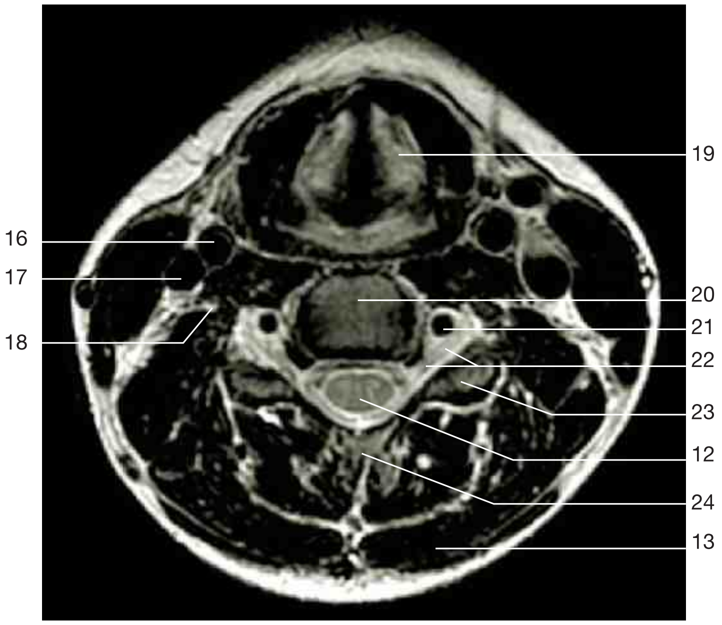


Occipital bone, atlas, and axis (left lateral aspect).

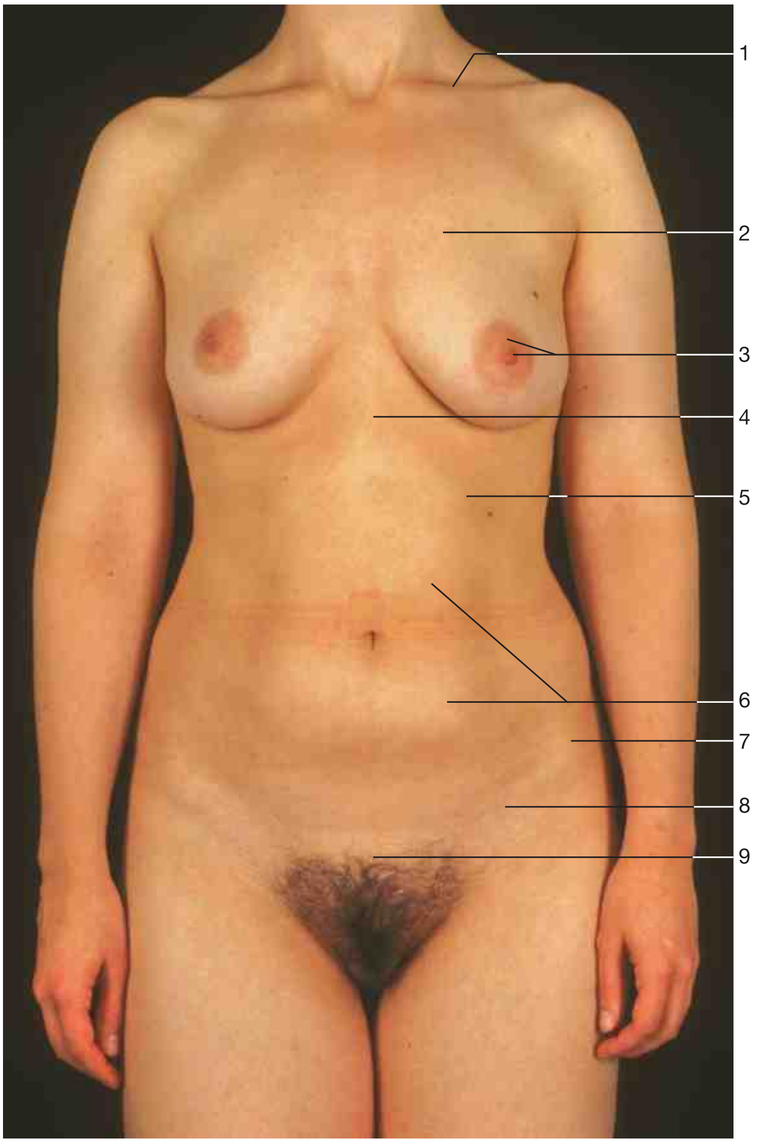
1 Pons
2 Base of skull (clivus)
3 Medulla oblongata
4 Atlas (anterior arch)
5 Dens of axis
6 Intervertebral disc
7 Body of cervical vertebra (C_4)
8 Site of larynx
9 Trachea
10 Cerebellum
11 Cerebellomedullary cistern
12 Spinal cord
13 Trapezius muscle
14 Muscles of the neck
15 Spinous process of cervical vertebra (C_7)
16 Internal jugular vein
17 Common carotid artery
18 Vagus nerve (n. X)
19 Larynx
20 Body of cervical vertebra
21 Vertebral artery
22 Spinal nerve with spinal ganglion
23 Transverse process of cervical vertebra
24 Spinous process of cervical vertebra



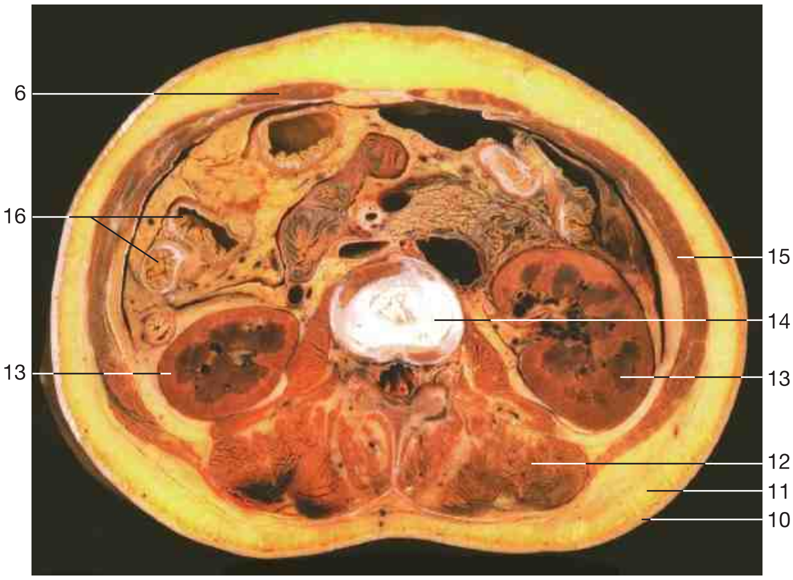
Midsagittal section of the neck showing the spinal cord in connection with medulla oblongata (MRI scan, courtesy of Prof. Heuck, Munich).



Horizontal section of the neck at the level of the larynx (MRI scan, courtesy of Prof. Heuck, Munich).

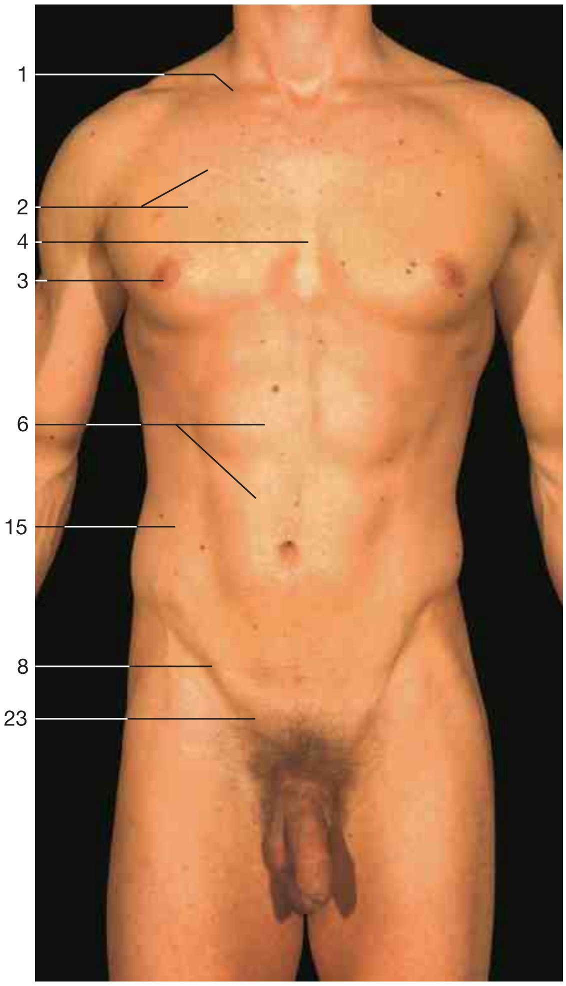


Surface anatomy of the anterior body wall in the female. Note the differences in thickness and structure of skin and hairs (compare with the section below).



Cross section of the body at the first lumbar vertebra. Note the differences in thickness of the subcutaneous layers.

1 Clavicle
2 Pectoralis major muscle
3 Areola and nipple
4 Infrasternal angle
5 Costal arch
6 Rectus abdominis muscle
7 Anterior superior iliac spine
8 Inguinal ligament
9 Mons pubis
10 Epidermis
11 Subcutaneous layer
12 Muscles of the back
13 Kidney
14 Body of lumbar vertebra
15 External abdominal oblique muscle
16 Small intestine
17 Deltoid muscle
18 Anterior serratus muscle
19 External intercostal muscle
20 Internal abdominal oblique muscle
21 Transverse abdominal muscle
22 Rectus sheath
23 Spermatic cord
24 Pectoralis minor muscle
25 Linea alba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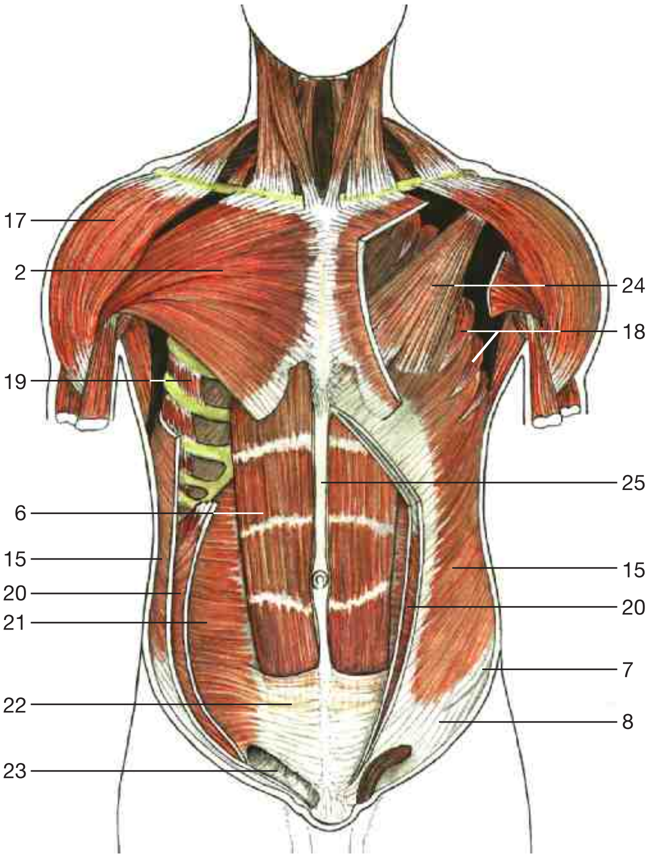
Surface anatomy of the anterior body wall in the male. Localization and structure of the muscles can be identified.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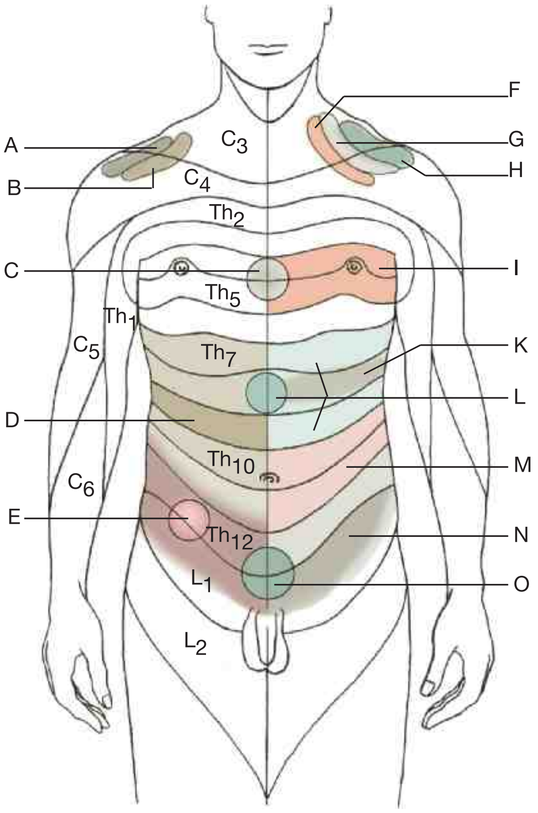
Muscles of the anterior body wall (schematic drawing).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C
D
E
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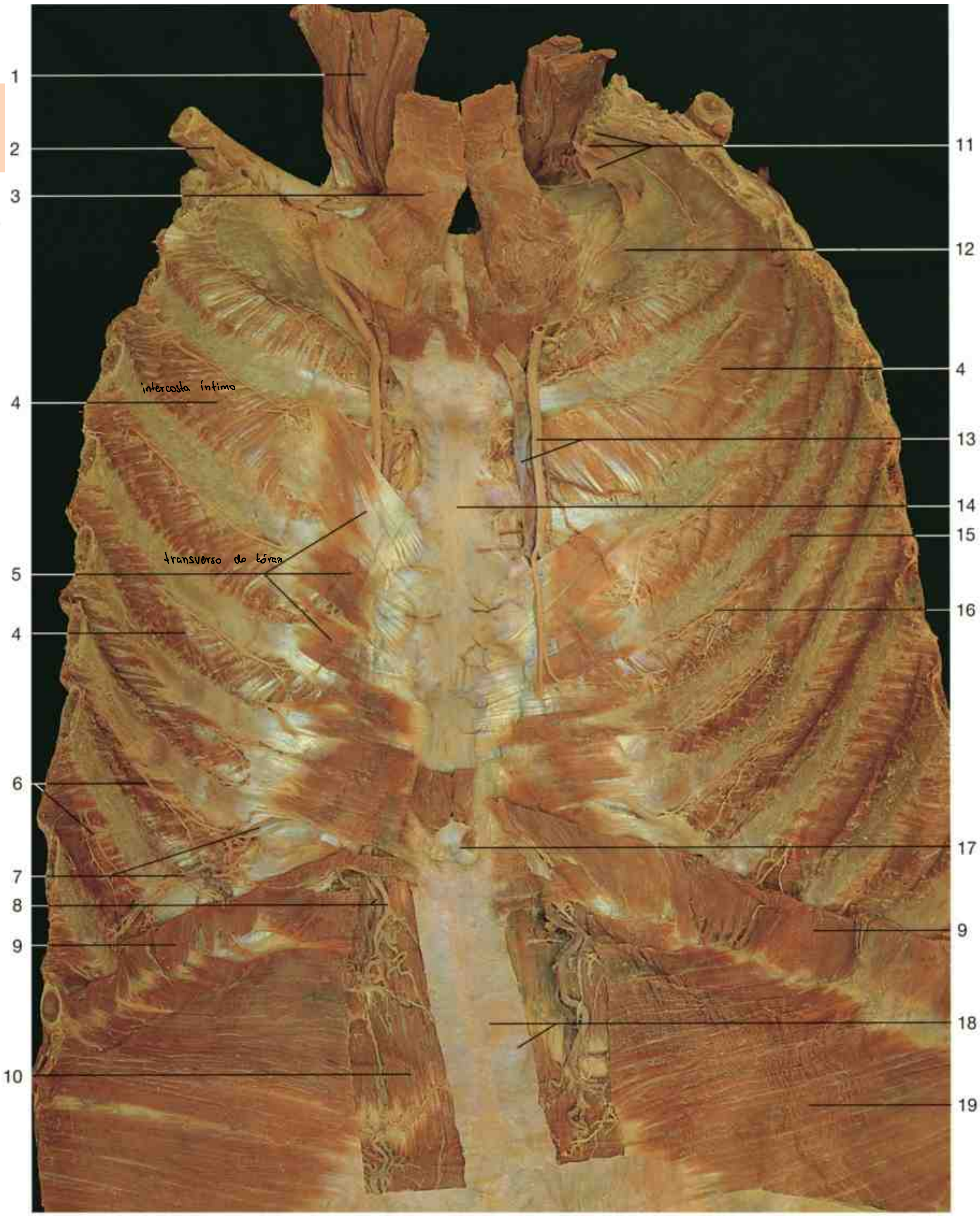
I
K
L
M
N
O
C_3
C_4
Th_2
Th_5
Th_1
C_5
Th_7
Th_{10}
C_6
Th_{12}
L_1
L_2

Head's areas

A = duodenum
B = gallbladder, liver (C_3–C_4)
C = esophagus (Th_4, Th_5)
D = liver, gallbladder (Th_6–Th_{11})
E = colon, vermiform appendix ($Th_{11–12}$, L_1)
F = heart
G = pancreas
H = stomach (C_3, C_4)
I = heart (Th_3, Th_4)
K = pancreas (Th_8)
L = stomach (Th_6–Th_9)
M = small intestine (Th_{10}–L_1)
N = kidney, ureter, testis (Th_{10}–L_1)
O = urinary bladder (Th_{11}–L_1)

◁ **Segments of anterior body wall.** Head's areas are indicated.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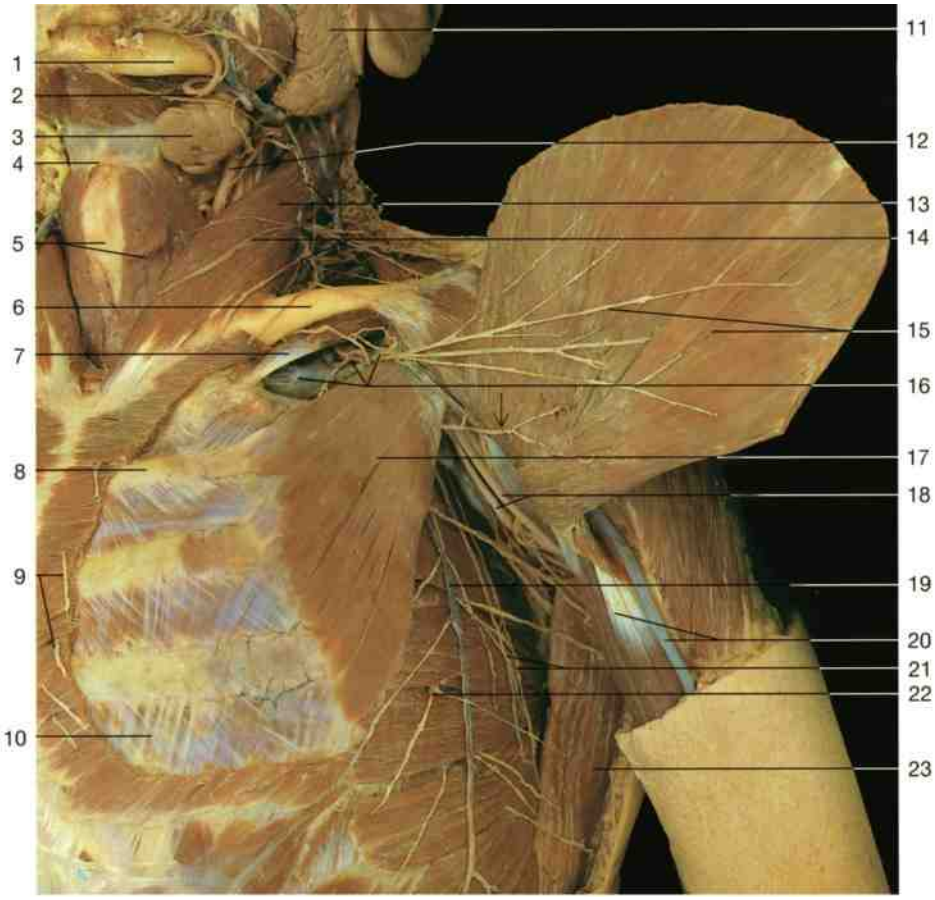
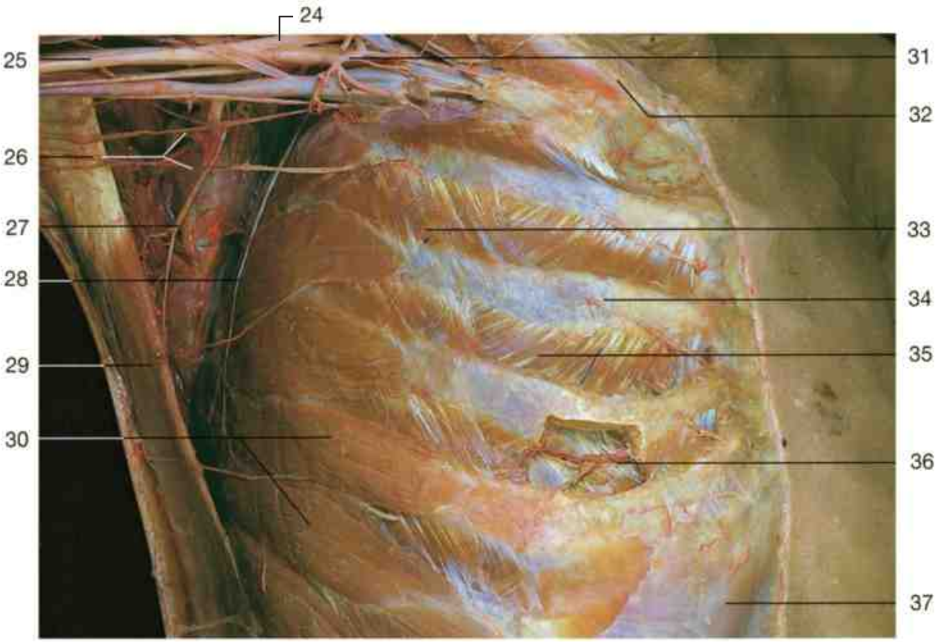
Anterior thoracic wall (posterior aspect). Diaphragm partly removed, posterior layer of rectus sheath fenestrated on both sides.

1 Sternocleidomastoid muscle (divided)
2 Clavicle
3 Sternothyroid muscle
4 Internal intercostal muscle
5 Transversus thoracic muscle
6 Intercostal arteries and nerves
7 Musculophrenic artery
8 Superior epigastric artery and vein
9 Diaphragm (divided)
10 Rectus abdominis muscle

11 Subclavian artery and brachial plexus
12 First rib
13 Internal thoracic artery and vein
14 Sternum
15 Innermost intercostal muscle
16 Intercostal artery and vein
17 Xiphoid process
18 Linea alba and posterior layer of rectus sheath
19 Transversus abdominis muscle



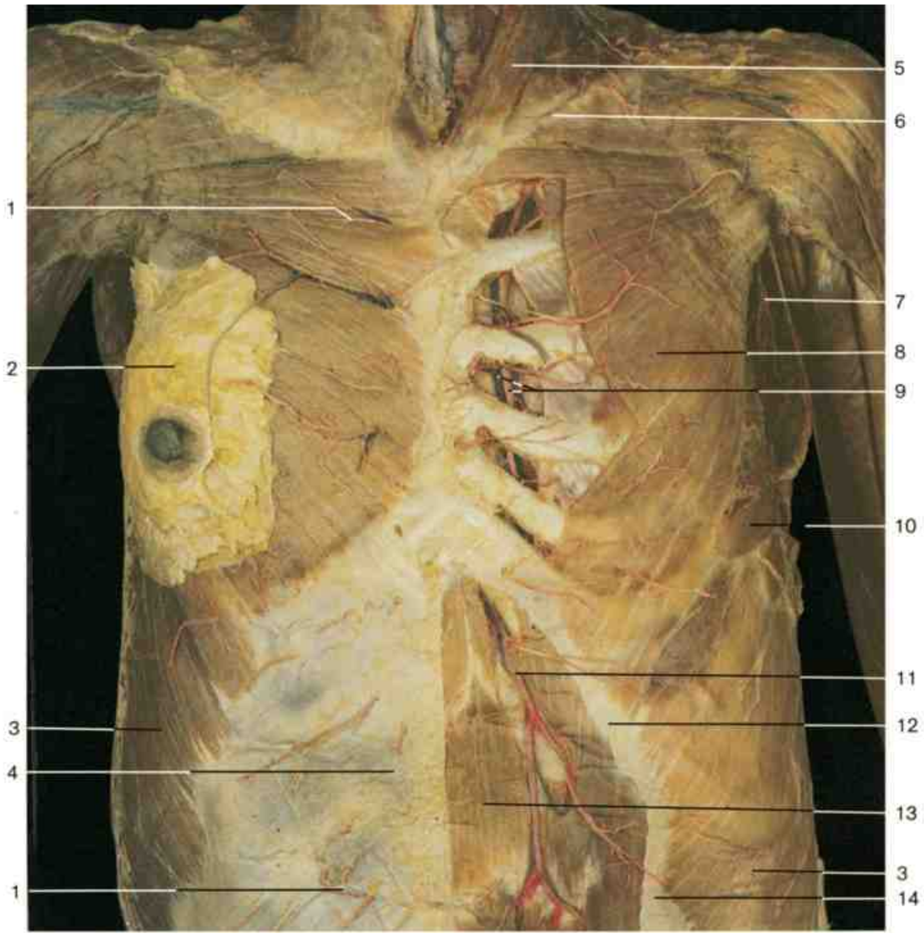
Thoracic wall (anterior aspect). Left pectoralis major muscle has been divided and reflected. Note the connection of the cephalic vein with the subclavian vein.
Arrow: medial pectoral nerve.



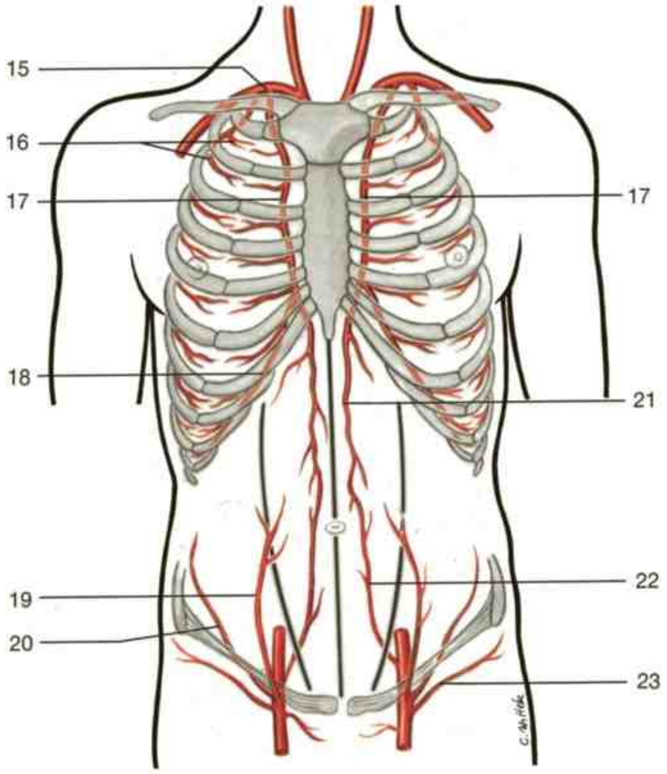
Thoracic wall (lateral aspect). Pectoralis major and minor muscles have been removed. A section of the fourth rib has been cut and removed to display the intercostal vessels and nerve.

1 Mandible
2 Facial artery
3 Submandibular gland
4 Hyoid bone
5 Thyroid cartilage and sternohyoid muscle
6 Clavicle
7 Subclavius muscle
8 Second rib
9 Anterior cutaneous branches of intercostal nerves
10 External intercostal membrane
11 Parotid gland
12 External carotid artery
13 Sternocleidomastoid muscle and cutaneous branches of cervical plexus
14 Supraclavicular nerves
15 Pectoralis major muscle and lateral pectoral nerves
16 Thoraco-acromial artery and subclavian vein
17 Pectoralis minor muscle
18 Median and ulnar nerve
19 Thoraco-epigastric vein
20 Cephalic vein and long head of biceps brachii muscle
21 Lateral thoracic artery and long thoracic nerve
22 Lateral cutaneous branches of intercostal nerve
23 Latissimus dorsi muscle
24 Median nerve
25 Axillary artery
26 Intercostobrachial nerves
27 Thoracodorsal nerve
28 Long thoracic nerve
29 Latissimus dorsi muscle
30 Serratus anterior muscle
31 Thoraco-acromial artery
32 Clavicle
33 External intercostal muscle
34 Third rib
35 Internal intercostal muscle
36 Anterior intercostal artery and vein, and intercostal nerve
37 Costal arch or margin

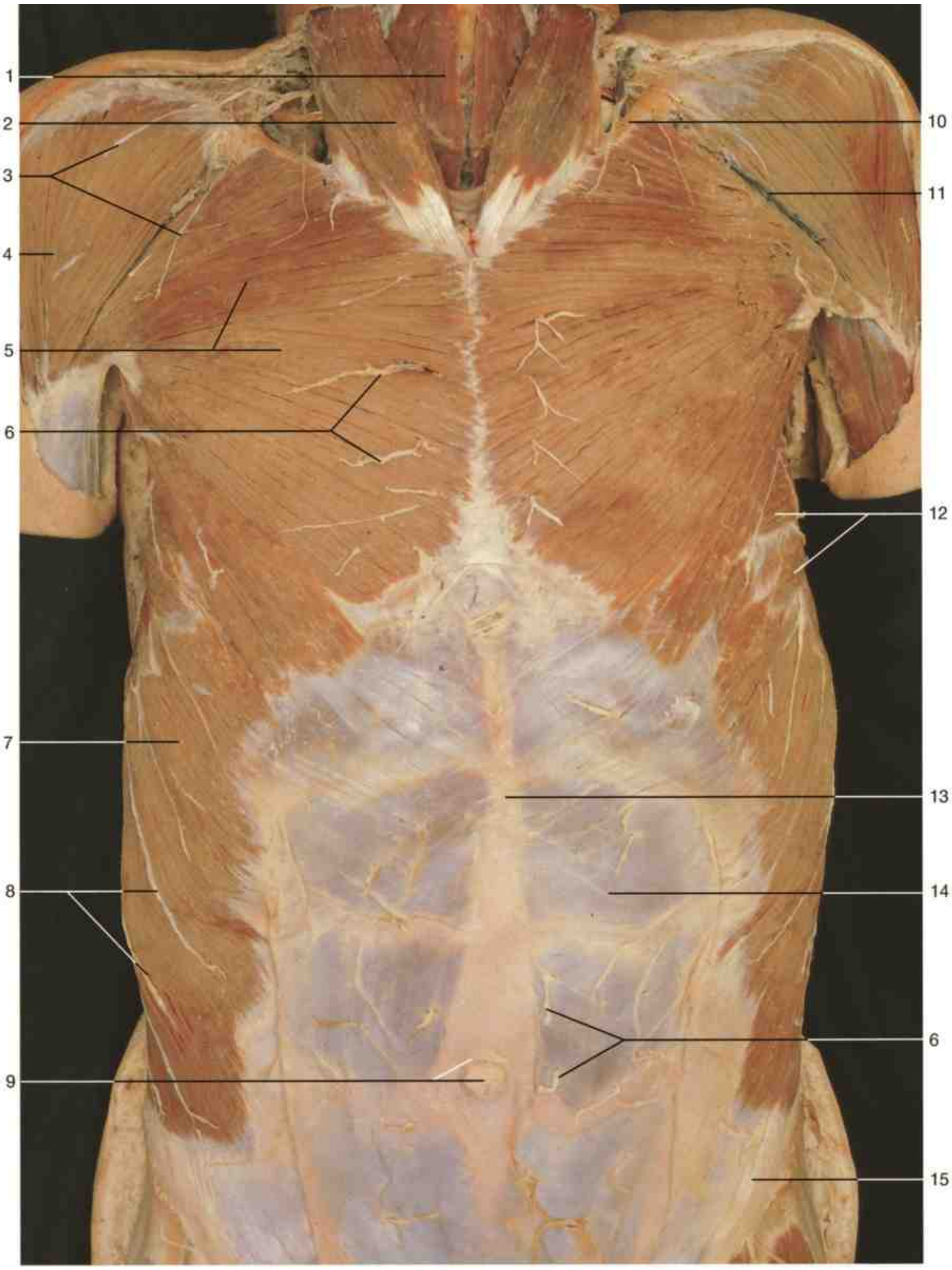
1 Anterior perforating branches of intercostal nerve
2 Mammary gland
3 External abdominal oblique muscle
4 Rectus sheath (anterior layer)
5 Sternocleidomastoid muscle
6 Clavicle
7 Lateral thoracic artery and vein
8 Pectoralis major muscle
9 Internal thoracic artery and vein
10 Serratus anterior muscle
11 Superior epigastric artery and vein
12 Costal margin
13 Rectus abdominis muscle
14 Cut edge of the anterior layer of the rectus sheath
15 Subclavian artery
16 Highest intercostal artery
17 Internal thoracic artery
18 Musculophrenic artery
19 Superficial epigastric artery
20 Deep circumflex iliac artery
21 Superior epigastric artery
22 Inferior epigastric artery
23 Superficial circumflex iliac artery



Thoracic wall (anterior aspect). Dissection of the **internal thoracic artery and vein.** Left pectoralis major muscle partly removed. Anterior lamina of the rectus sheath on the left side has been removed.

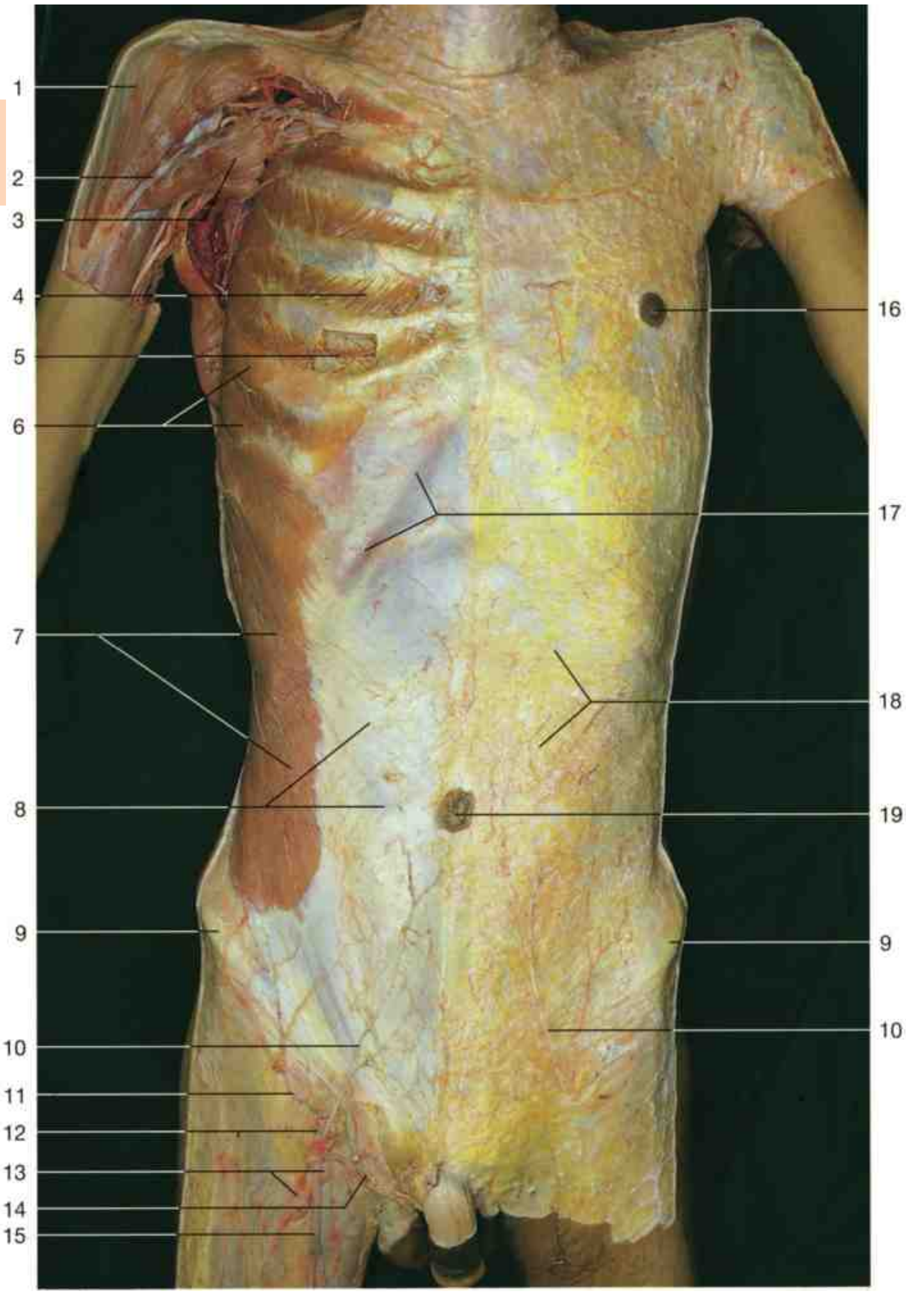


Main arteries of thoracic and abdominal walls.



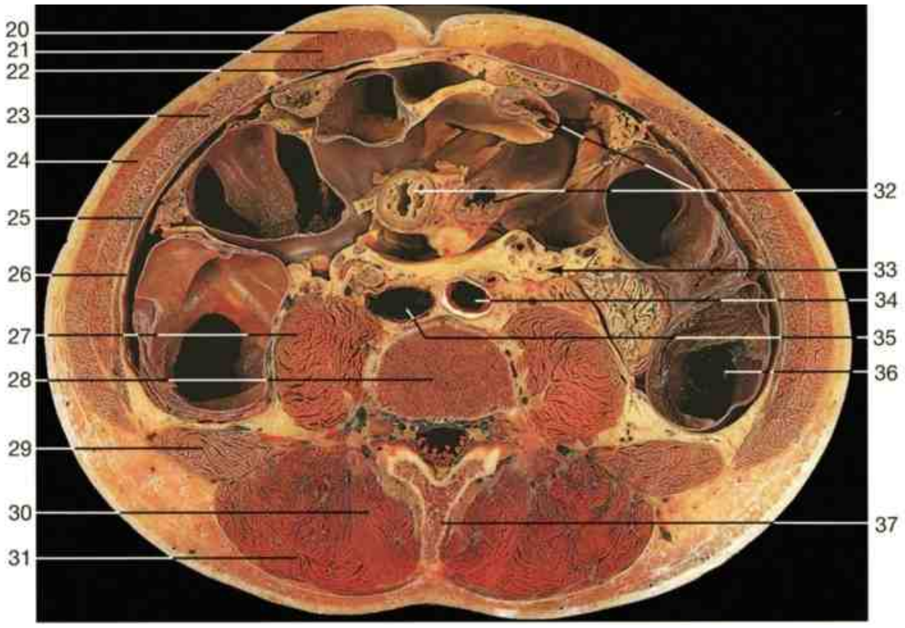
Anterior thoracic and abdominal walls with superficial muscles. The fascia of pectoralis major muscle and the abdominal wall have been removed; the anterior layer of the sheath of the rectus abdominis muscle is displayed.

1 Sternohyoid muscle
2 Sternocleidomastoid muscle
3 Supraclavicular nerves (branches of cervical plexus)
4 Deltoid muscle
5 Pectoralis major muscle
6 Anterior cutaneous branches of intercostal nerves
7 External abdominal oblique muscle
8 Lateral cutaneous branches of intercostal nerves
9 Umbilicus and umbilical ring
10 Clavicle
11 Cephalic vein
12 Serratus anterior muscle
13 Linea alba
14 Sheath of rectus abdominis muscle (anterior layer)
15 Inguinal ligament



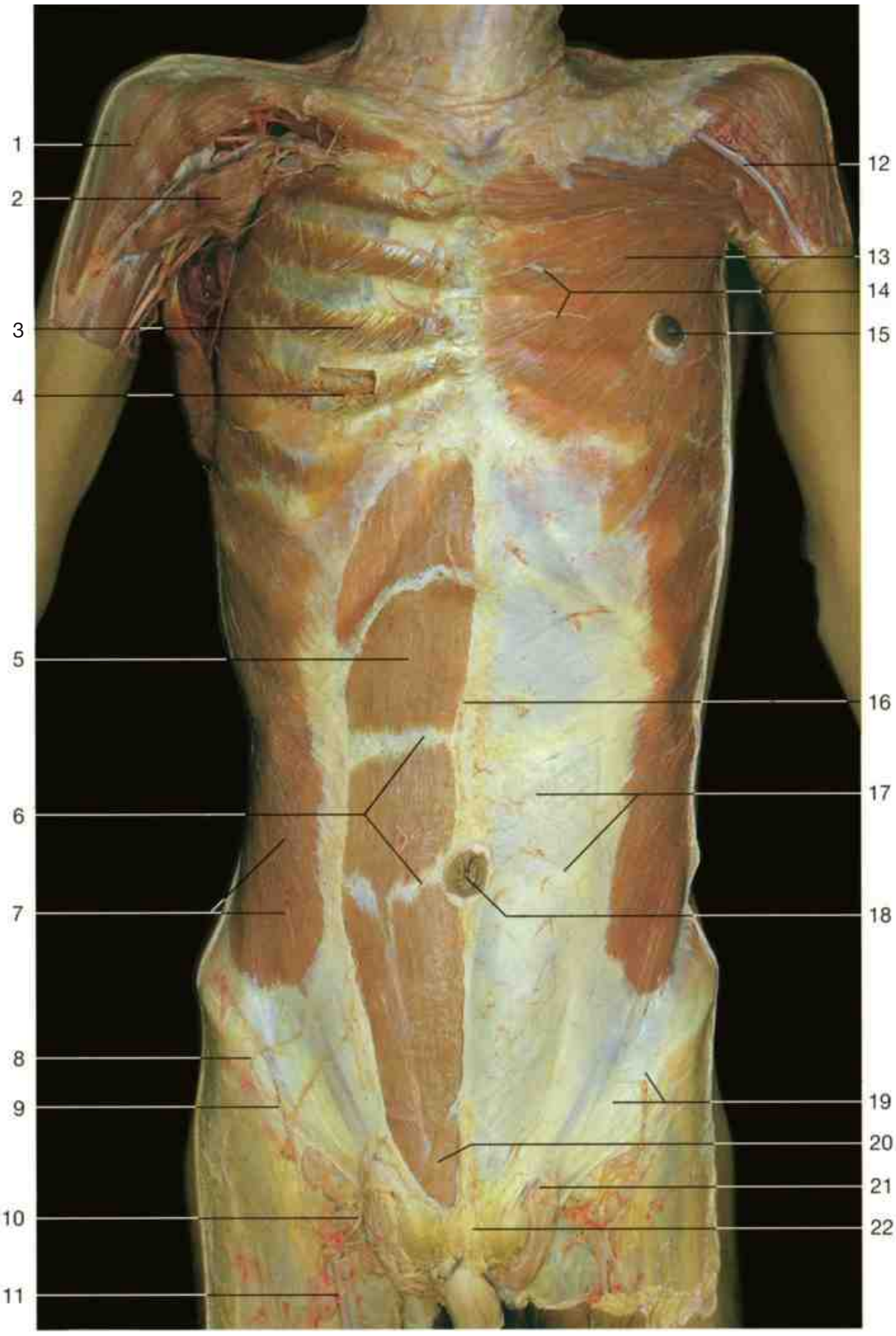
1 Deltoid muscle
2 Cephalic vein
3 Pectoralis major muscle (divided)
4 Internal intercostal muscle
5 Intercostal artery and vein (intercostal space, fenestrated)
6 Serratus anterior muscle
7 External abdominal oblique muscle
8 Anterior layer of rectus sheath
9 Iliac crest
10 Superficial epigastric vein
11 Superficial circumflex iliac vein
12 Saphenous opening
13 Superficial inguinal lymph nodes
14 Superficial external pudendal veins
15 Great saphenous vein
16 Nipple
17 Costal margin
18 Subcutaneous fatty tissue
19 Umbilicus
20 Anterior layer of rectus sheath
21 Rectus abdominis muscle
22 Posterior layer of rectus sheath
23 Internal abdominal oblique muscle
24 External abdominal oblique muscle (cut)
25 Transversus abdominis muscle
26 Transversalis fascia and peritoneum
27 Psoas major muscle
28 Body of lumbar vertebra (L_4)
29 Quadratus lumborum muscle
30 Medial tract of erector spinae muscle
31 Lateral tract of erector spinae muscle (longissimus and iliocostalis muscles)
32 Small intestine
33 Left ureter
34 Abdominal aorta
35 Inferior vena cava
36 Descending colon
37 Spinous process

Thoracic and abdominal walls. Right pectoralis major and minor muscles are divided. Muscles of thoracic and abdominal walls on right side are displayed.

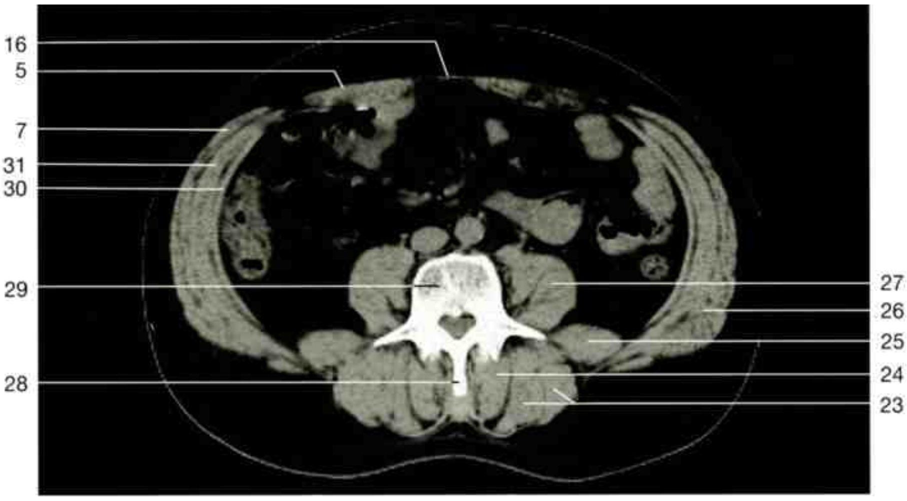


Horizontal section of the trunk at the level of the umbilicus, superior to arcuate line (inferior aspect).

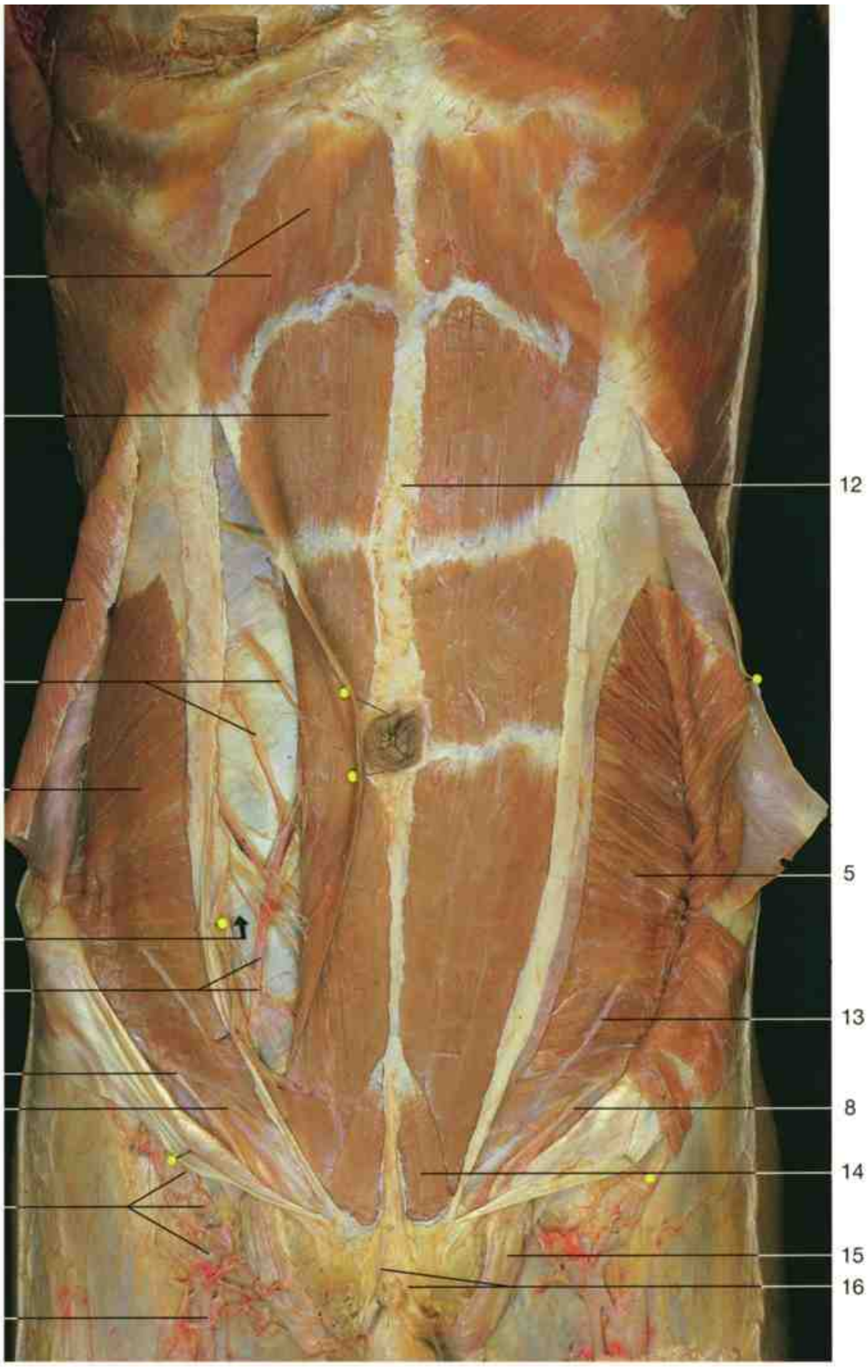
1	Deltoid muscle
2	Pectoralis major muscle (divided)
3	Internal intercostal muscle
4	Intercostal artery and vein
5	Rectus abdominis muscle
6	Tendinous intersections
7	External abdominal oblique muscle
8	Anterior superior iliac spine
9	Superficial circumflex iliac vein
10	Superficial epigastric vein
11	Great saphenous vein
12	Cephalic vein
13	Pectoralis major muscle
14	Anterior cutaneous branches of intercostal nerves
15	Nipple
16	Linea alba
17	Anterior layer of rectus sheath
18	Umbilicus
19	Inguinal ligament
20	Pyramidal muscle
21	Superficial inguinal ring and spermatic cord
22	Suspensory ligament of penis
23	Longissimus and iliocostalis muscles
24	Multifidus muscle
25	Quadratus lumborum muscle
26	Latissimus dorsi muscle
27	Psoas major muscle
28	Spinous process
29	Body of first lumbar vertebra
30	Transversus abdominis muscle
31	Internal abdominal oblique muscle



Thoracic and abdominal walls. Right pectoralis major and minor muscles and anterior layer of rectus sheath have been removed on the right side.

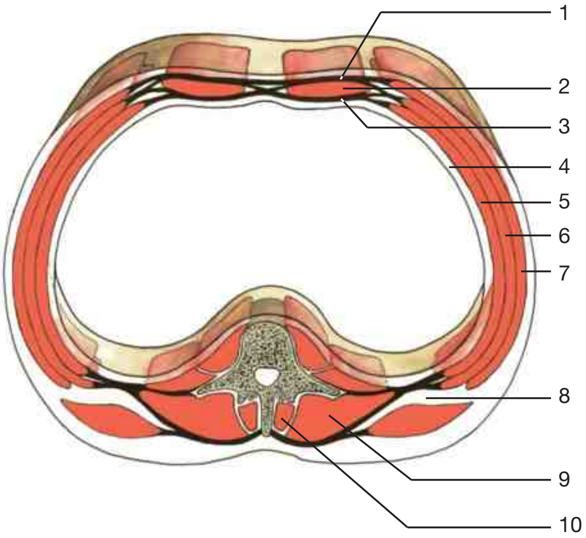


Horizontal section through the body at the level of fourth lumbar vertebra; seen from below. (CT scan.)



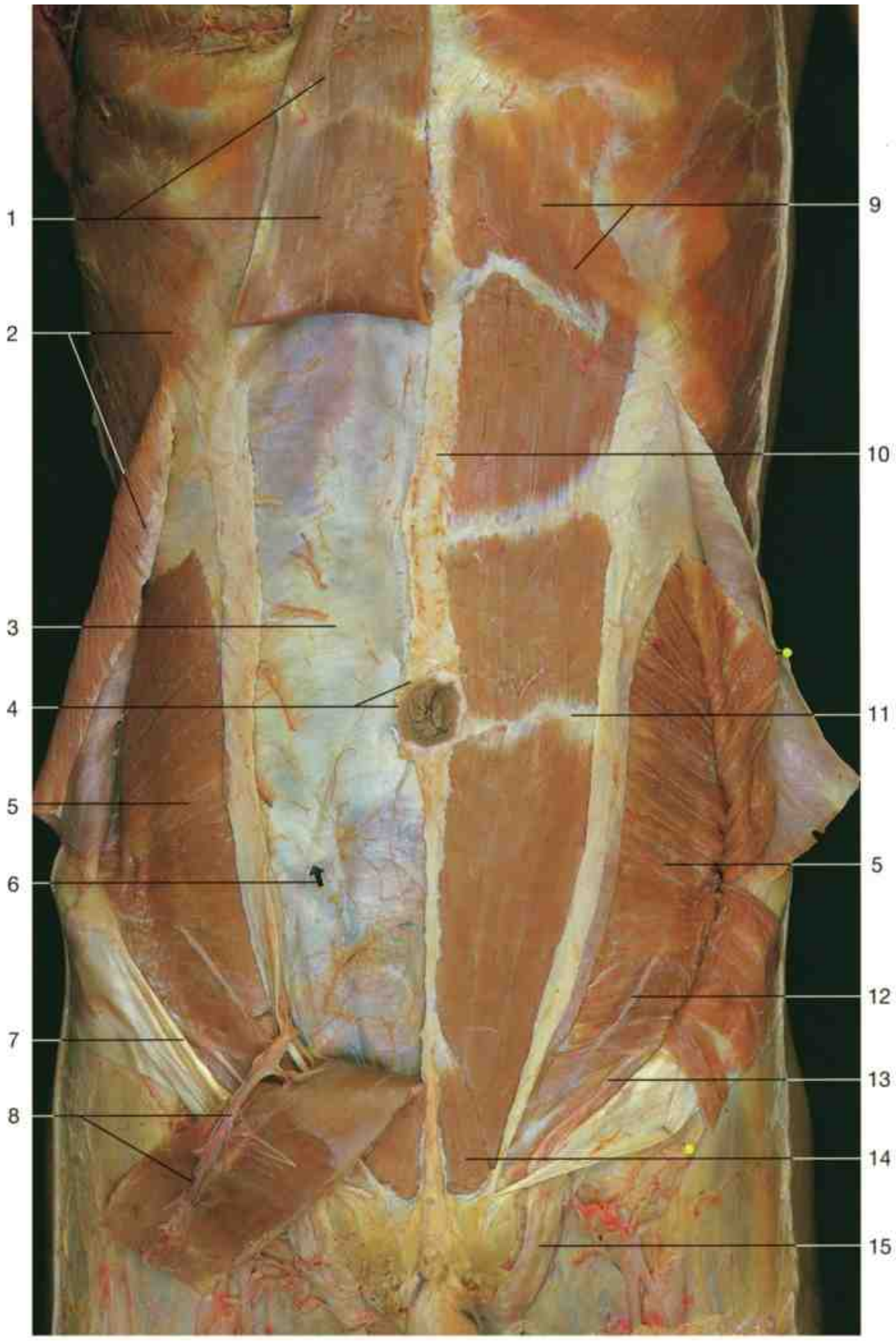
1 Costal margin
2 Rectus abdominis muscle
3 External abdominal oblique muscle (reflected)
4 Thoraco-abdominal (intercostal) nerves with accompanying vessels
5 Internal abdominal oblique muscle
6 Arcuate line (arrow)
7 Inferior epigastric artery and vein
8 Ilio-inguinal nerve
9 Position of deep inguinal ring
10 Superficial inguinal lymph nodes
11 Great saphenous vein
12 Linea alba
13 Iliohypogastric nerve
14 Pyramidal muscle
15 Spermatic cord
16 Fundiform ligament of penis

Thoracic and abdominal walls. External abdominal oblique muscle has been divided and reflected on both sides. The right rectus muscle has been reflected medially to display the posterior layer of rectus sheath. Arrow: location of arcuate line.



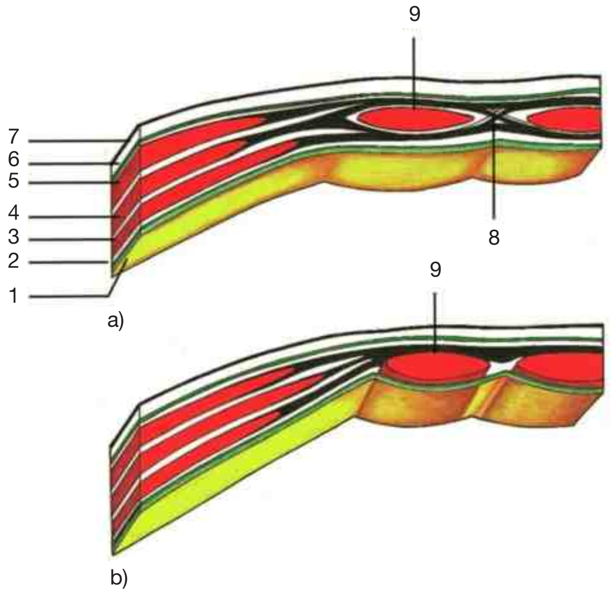
1 Anterior layer of rectus sheath
2 Rectus abdominis muscle
3 Posterior layer of rectus sheath
4 Transversalis fascia
5 Transversus abdominis muscle
6 Internal oblique muscle
7 External oblique muscle
8 Thoracolumbar fascia with superficial and deep layer
9 Lateral column of erector spinae muscle
10 Medial column of intrinsic muscles of the back

Horizontal section of the trunk superior to arcuate line (schematic drawing).



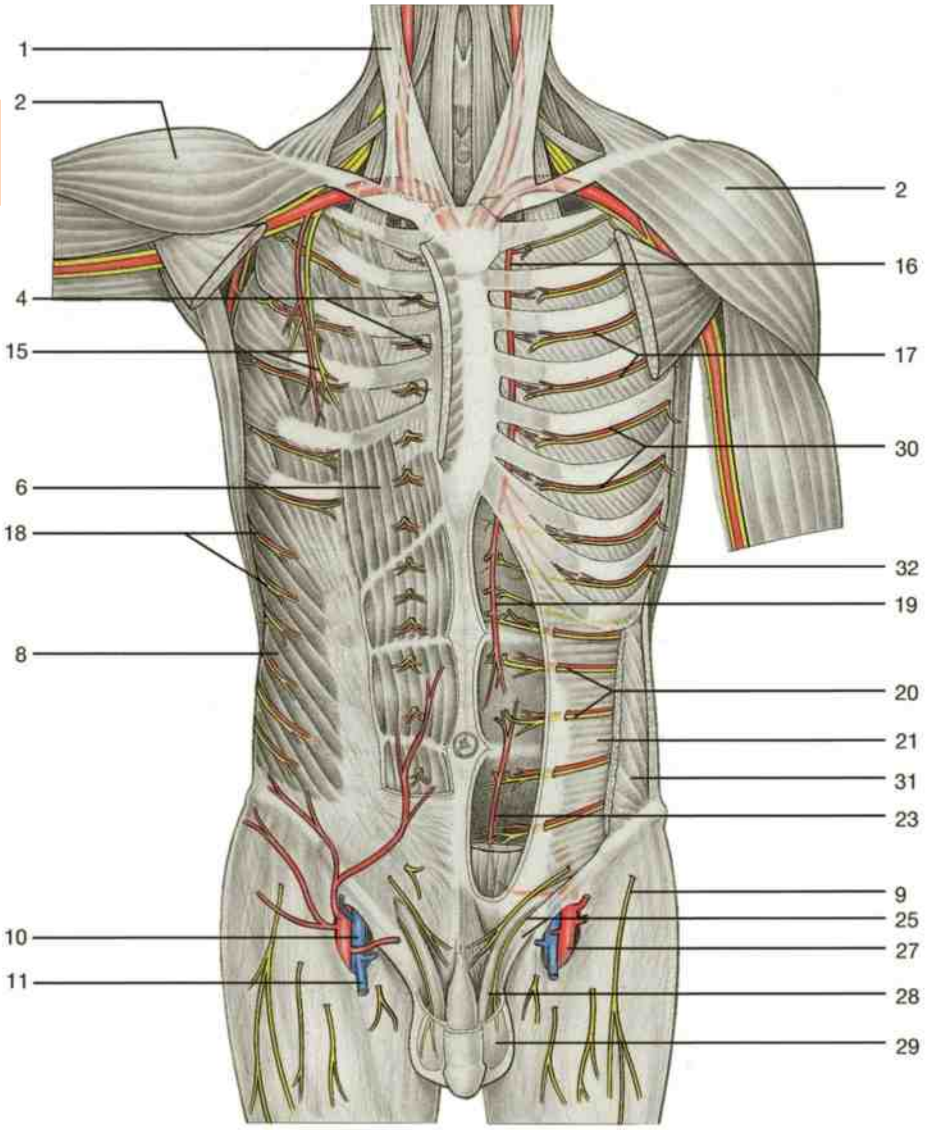
1 Rectus abdominis muscle (reflected)
2 External abdominal oblique muscle (divided)
3 Posterior layer of rectus sheath
4 Umbilical ring
5 Internal abdominal oblique muscle
6 Arcuate line (arrow)
7 Inguinal ligament
8 Inferior epigastric artery and vein and rectus abdominis muscle (divided and reflected)
9 Costal margin
10 Linea alba
11 Tendinous intersection
12 Iliohypogastric nerve
13 Ilio-inguinal nerve
14 Pyramidal muscle
15 Spermatic cord

Thoracic and abdominal walls. External abdominal oblique muscle has been divided and reflected on both sides. The right rectus muscle has been cut and reflected to display the posterior layer of rectus sheath. Arrow: location of arcuate line.



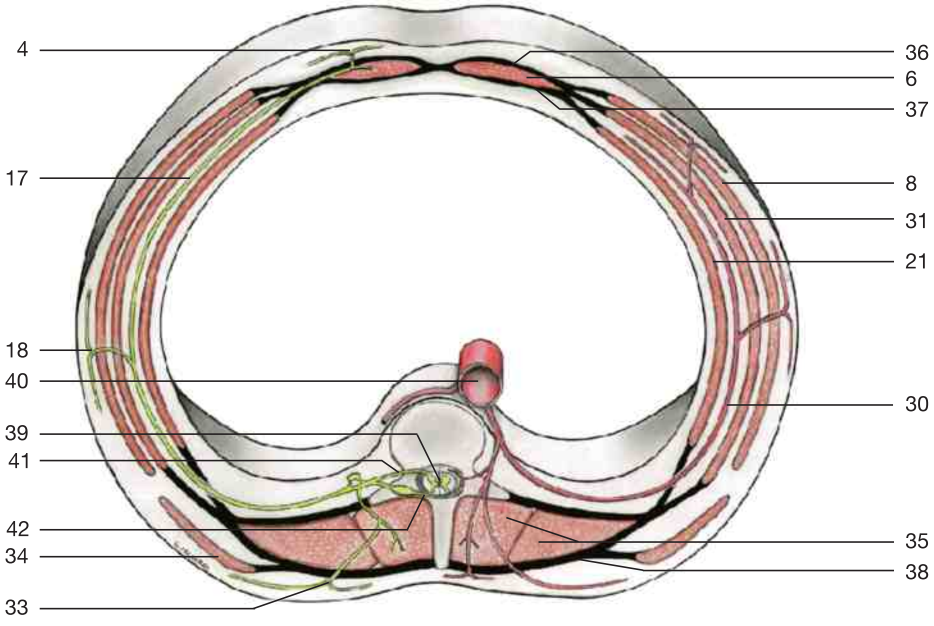
1 Peritoneum
2 Transversalis fascia (green)
3 Transversus abdominis muscle
4 Internal abdominal oblique muscle
5 External abdominal oblique muscle
6 Fascia of external abdominal oblique muscle (green)
7 Skin
8 Linea alba
9 Rectus abdominis muscle

Transverse sections through the abdominal wall superior (a) and inferior (b) to arcuate line.

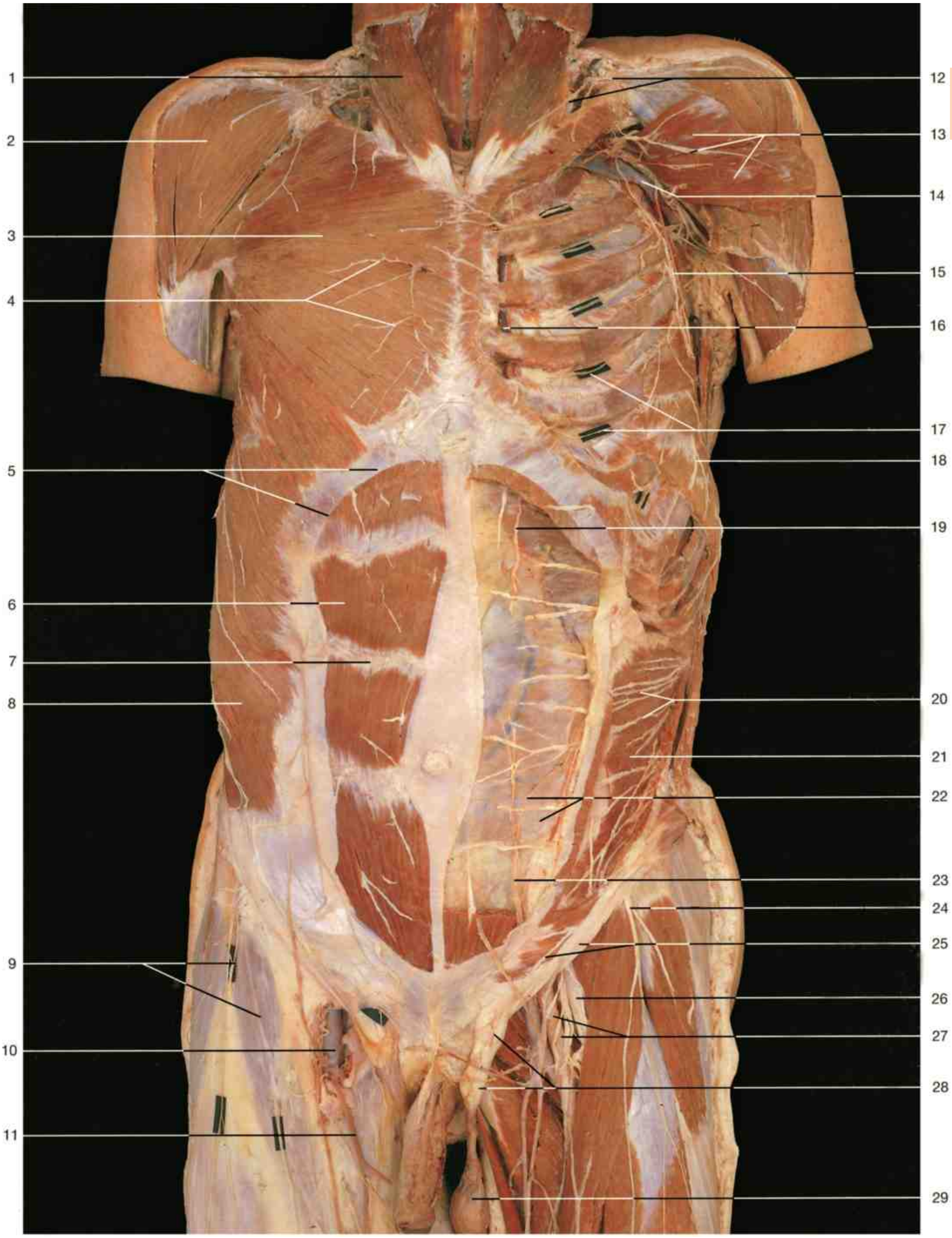


Thoracic and abdominal walls (schematic drawing). Note the segmental organization of the blood vessels and nerves. Right side: superficial layers; left side: deeper layers.

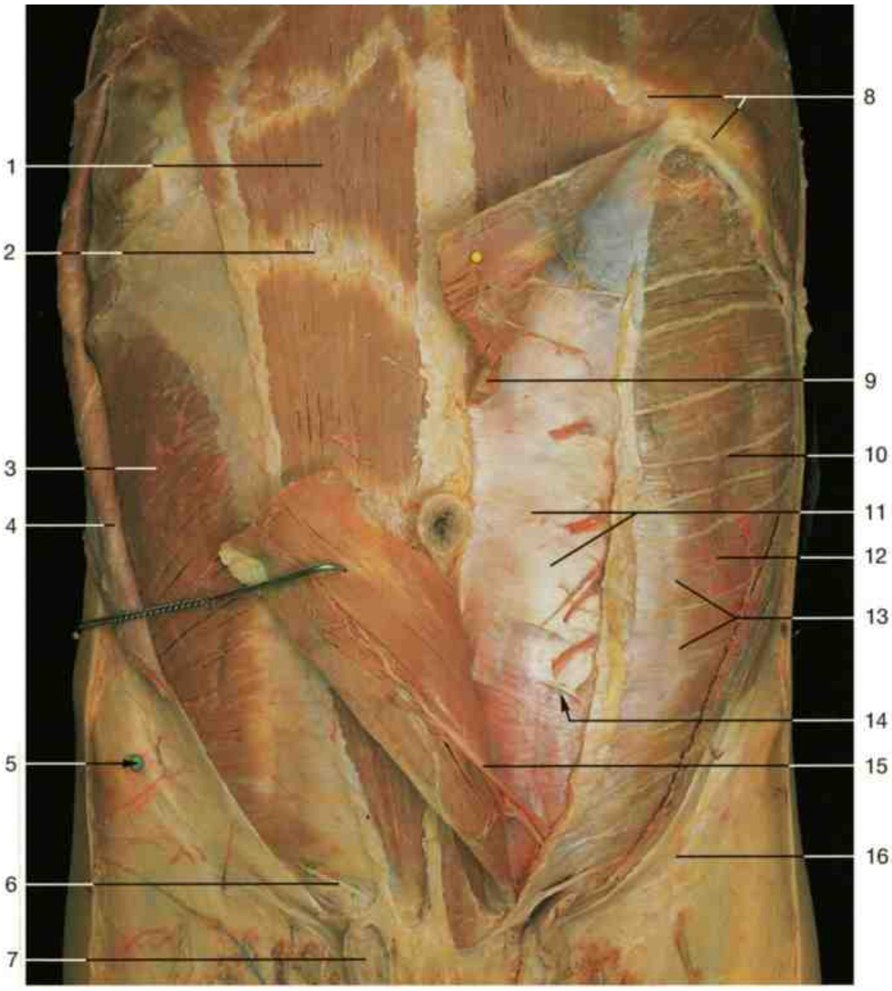
1 Sternocleidomastoid muscle
2 Deltoid muscle
3 Pectoralis major muscle
4 Anterior cutaneous branches of intercostal nerves
5 Cut edge of anterior layer of rectus sheath
6 Rectus abdominis muscle
7 Tendinous intersection
8 External abdominal oblique muscle
9 Lateral femoral cutaneous nerve
10 Femoral vein
11 Great saphenous vein
12 Medial supraclavicular nerves
13 Pectoralis minor muscle (reflected) and medial pectoral nerves
14 Axillary vein
15 Long thoracic nerve and lateral thoracic artery
16 Internal thoracic artery
17 Intercostal nerves
18 Lateral cutaneous branches of intercostal nerves
19 Superior epigastric artery
20 Thoraco-abdominal (intercostal) nerves
21 Transversus abdominis muscle
22 Posterior layer of rectus sheath
23 Inferior epigastric artery
24 Lateral femoral cutaneous nerve
25 Inguinal ligament and ilio-inguinal nerve
26 Femoral nerve
27 Femoral artery
28 Spermatic cord
29 Testis
30 Posterior intercostal arteries
31 Internal abdominal oblique muscle
32 Lateral cutaneous branch of intercostal nerve
33 Dorsal branch of spinal nerve
34 Latissimus dorsi muscle
35 Deep muscles of the back (medial and lateral tract)
36 Anterior layer of rectus sheath
37 Posterior layer of rectus sheath
38 Thoracolumbar fascia
39 Spinal cord
40 Aorta
41 Ventral root } of spinal
42 Dorsal root } nerve



Horizontal section of the abdominal wall (from below) showing the location of the intercostal arteries (left side) and nerves (right side).

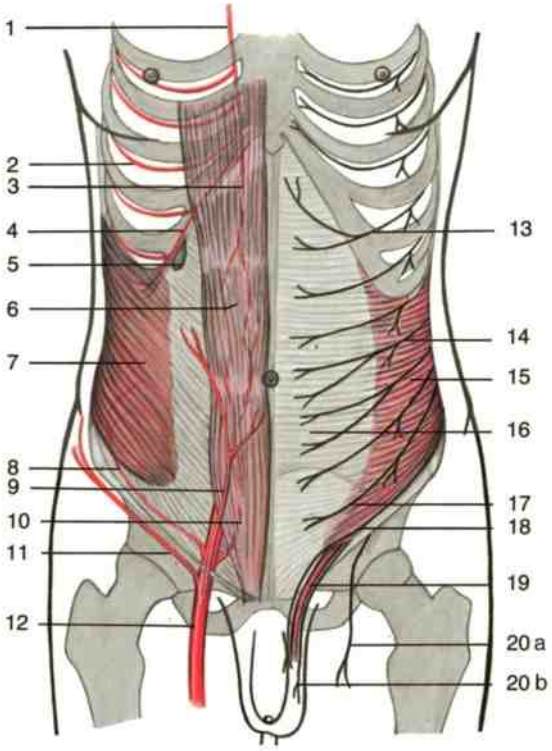


Thoracic and abdominal walls with vessels and nerves (anterior aspect)**.** Right side: superficial layers; left side: deeper layers. Pectoralis major and minor muscles, the external and internal intercostal muscles on the left side have been removed to display the intercostal nerves. The anterior layer of rectus sheath, the left rectus abdominis muscle, and the external and internal abdominal oblique muscles have been removed to show the thoraco-abdominal nerves within the abdominal wall.



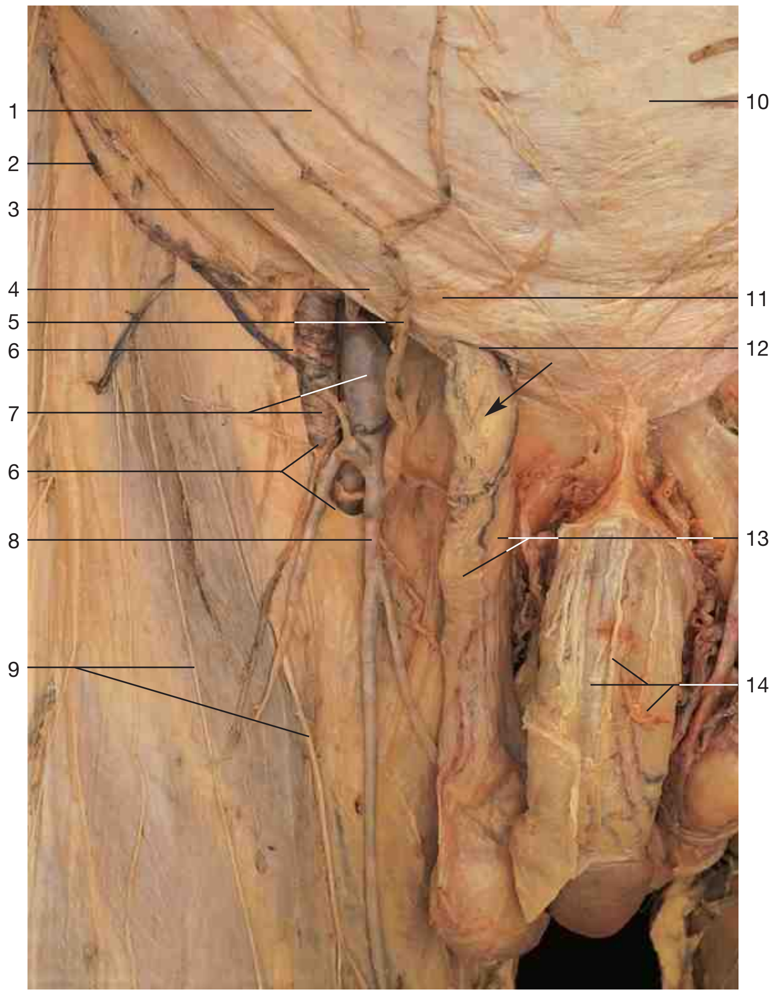
Abdominal wall with vessels and nerves. The left rectus abdominis muscle has been divided and reflected to display the inferior epigastric vessels. The left internal abdominal oblique muscle has been removed to show the thoraco-abdominal nerves.

1 Rectus abdominis muscle
2 Tendinous intersection
3 Internal abdominal oblique muscle
4 External abdominal oblique muscle (reflected)
5 Anterior superior iliac spine
6 Ilio-inguinal nerve
7 Spermatic cord
8 Costal margin
9 Superior epigastric artery
10 Thoraco-abdominal (intercostal) nerves
11 Posterior layer of rectus sheath
12 Transversus abdominis muscle
13 Semilunar line
14 Arcuate line
15 Inferior epigastric artery
16 Inguinal ligament

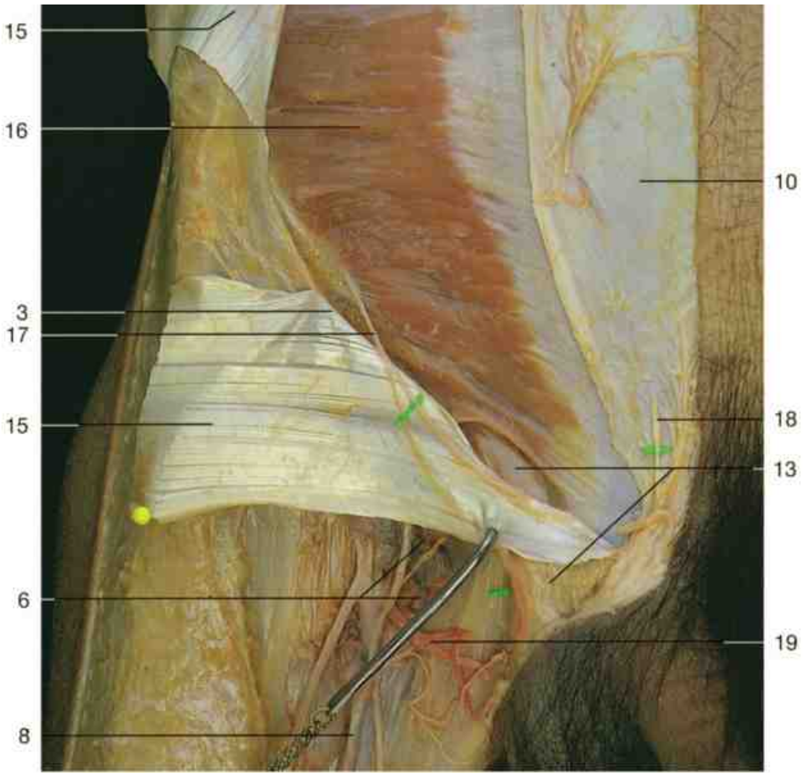


Arteries and nerves that supply the thoracic and abdominal walls. Note their segmental arrangement (schematic drawing).

1 Internal thoracic artery
2 Intercostal artery
3 Superior epigastric artery
4 Musculophrenic artery
5 Gallbladder
6 Rectus abdominis muscle
7 External abdominal oblique muscle
8 Deep circumflex iliac artery
9 Superficial epigastric artery
10 Inferior epigastric artery
11 Superficial circumflex iliac artery
12 Femoral artery
13 Intercostal nerve
14 Thoraco-abdominal nerve (T_{10})
15 Transversus abdominis muscle
16 Posterior layer of the rectus sheath
17 Iliohypogastric nerve (L_1)
18 Ilio-inguinal nerve (L_1)
19 Spermatic cord
20 Genitofemoral nerve (L_1, L_2)
  a Femoral branch
  b Genital branch

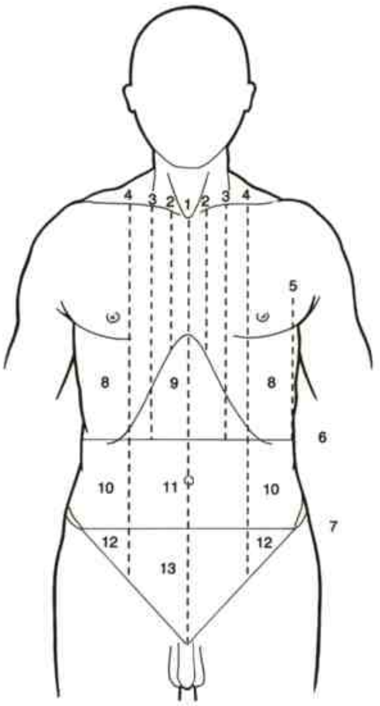


Inguinal canal in the male, right side (superficial layer, anterior aspect). There is a small inguinal hernia (arrow).



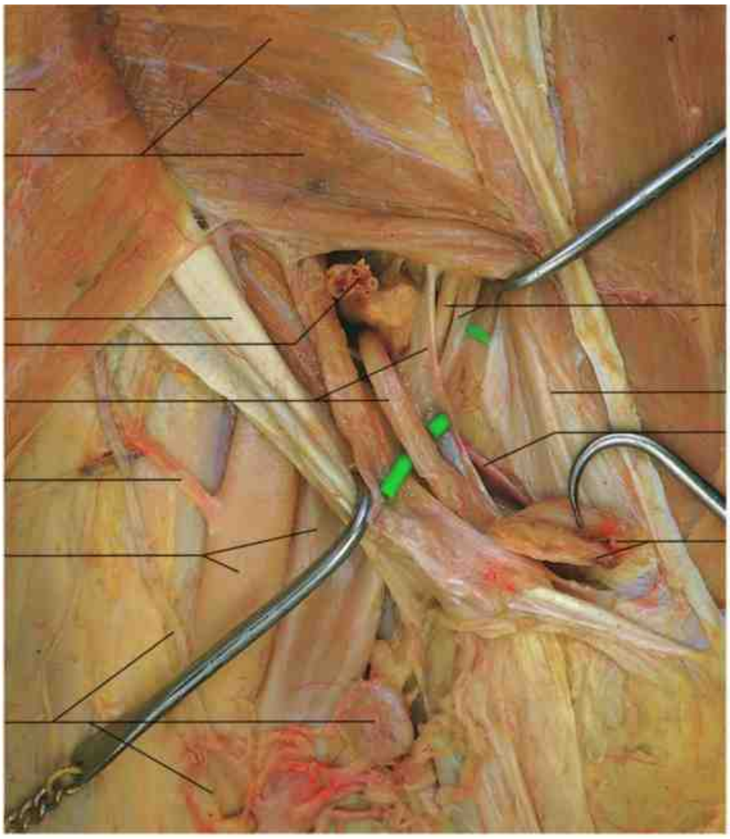
Inguinal canal in the male, right side (anterior aspect). The external abdominal oblique muscle has been divided to display the inguinal canal.

1 Aponeurosis of external abdominal oblique muscle
2 Superficial circumflex iliac vein
3 Inguinal ligament
4 Lateral crus of inguinal ring
5 Superficial epigastric vein
6 Saphenous opening
7 Femoral artery and vein
8 Great saphenous vein
9 Anterior cutaneous branches of femoral nerve
10 Anterior layer of rectus sheath
11 Intercrural fibers
12 Superficial inguinal ring
13 Spermatic cord and genital branch of genitofemoral nerve
14 Penis with dorsal nerves and deep dorsal vein of penis
15 Aponeurosis of external abdominal oblique muscle (divided and reflected)
16 Internal abdominal oblique muscle
17 Ilio-inguinal nerve
18 Anterior cutaneous branches of iliohypogastric nerve
19 Superficial external pudendal veins

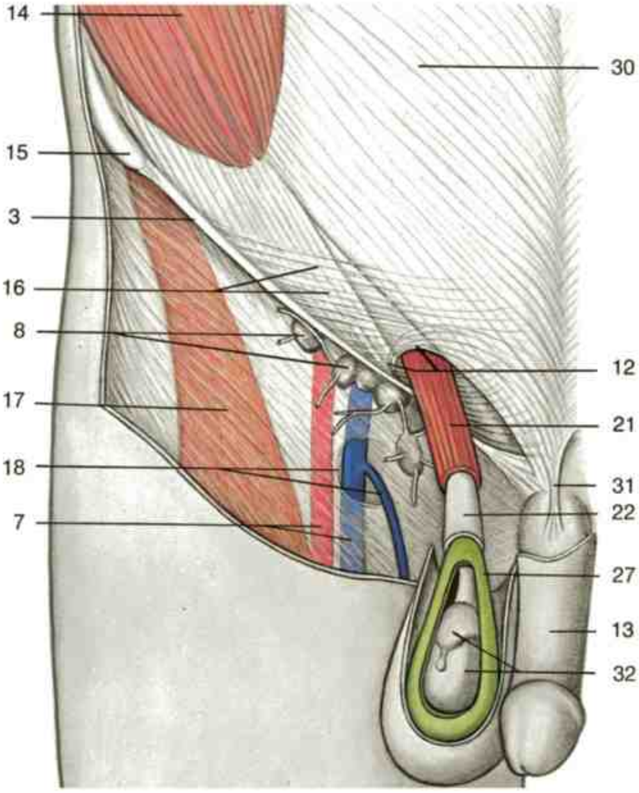


Regions and reference lines for delineating surface projections.

1 Median line
2 Lateral sternal line
3 Parasternal line
4 Midclavicular line
5 Axillary line
6 Transpyloric plane
7 Transtubercular plane
8 Hypochondriac region
9 Epigastric region
10 Lumbar region
11 Umbilical region
12 Iliac region
13 Hypogastric region



Inguinal canal in the male, right side (deep layer, anterior aspect). Spermatic cord with exception of ductus deferens (probe) has been divided and reflected.

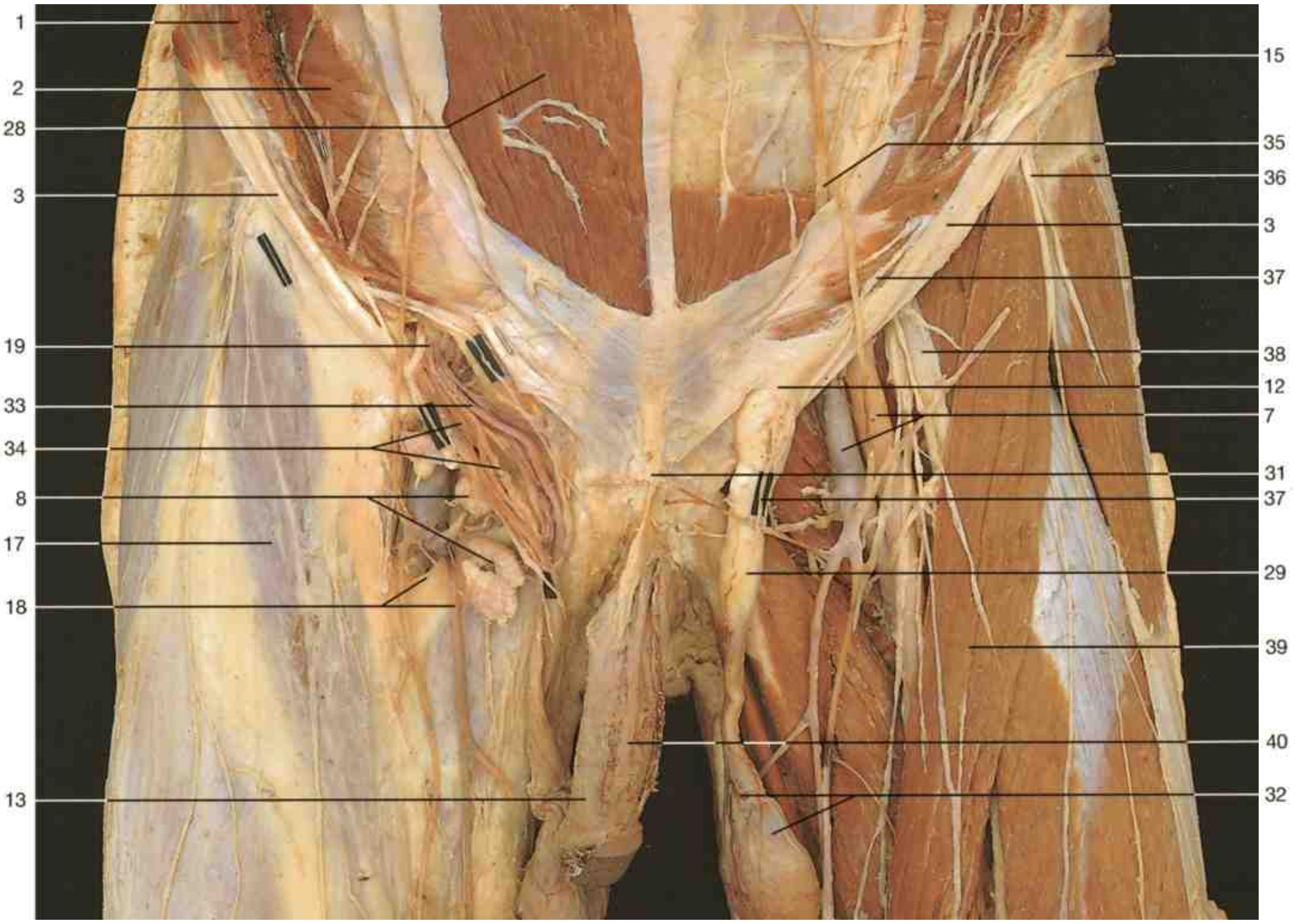


General characteristics of lower part of anterior abdominal wall and inguinal canal (schematic drawing).

1 Internal abdominal oblique muscle (reflected)
2 Transversus abdominis muscle
3 Inguinal ligament
4 Spermatic cord with the exception of the ductus deferens (divided and reflected)
5 Ductus deferens and interfoveolar ligament
6 Superficial circumflex iliac artery
7 Femoral artery and vein
8 Superficial inguinal lymph nodes and inguinal lymph vessel
9 Inferior epigastric artery and vein
10 Falx inguinalis or conjoint tendon (cut)
11 Pubic branch of inferior epigastric artery
12 Superficial inguinal ring
13 Penis
14 External abdominal oblique muscle
15 Anterior superior iliac spine
16 Intercrural fibers
17 Fascia lata and sartorius muscle
18 Saphenous opening and great saphenous vein
19 Deep inguinal ring
20 Skin of scrotum and dartos muscle
21 Cremaster muscle
22 Internal spermatic fascia
23 Ductus deferens
24 Epididymis
25 Peritoneum (blue)
26 Remnant of processus vaginalis
27 Tunica vaginalis testis
28 Rectus abdominis muscle
29 Spermatic cord with ductus deferens covered by external spermatic fascia
30 Anterior layer of rectus sheath
31 Suspensory ligament of penis
32 Testis and epididymis
33 Ductus deferens
34 Pampiniform venous plexus and testicular artery
35 Inferior epigastric artery
36 Lateral femoral cutaneous nerve
37 Ilio-inguinal nerve
38 Femoral nerve
39 Sartorius muscle
40 Deep dorsal vein of penis

Inguinal hernias may either pass through the inguinal canal lateral to the inferior epigastric artery (indirect or lateral inguinal hernias, A and C) or directly penetrate the abdominal wall through the inguinal triangle located medial to the inferior epigastric artery (direct or medial inguinal hernias, B). The lateral hernias can be congenital if the vaginal process remains open (C) or acquired (A) if the hernia develops independently of a patent processus vaginalis.

Femoral hernias generally protrude through the femoral ring below the inguinal ligament. Proper assessment of the site of herniation requires the identification of both the inguinal ligament and the epigastric artery.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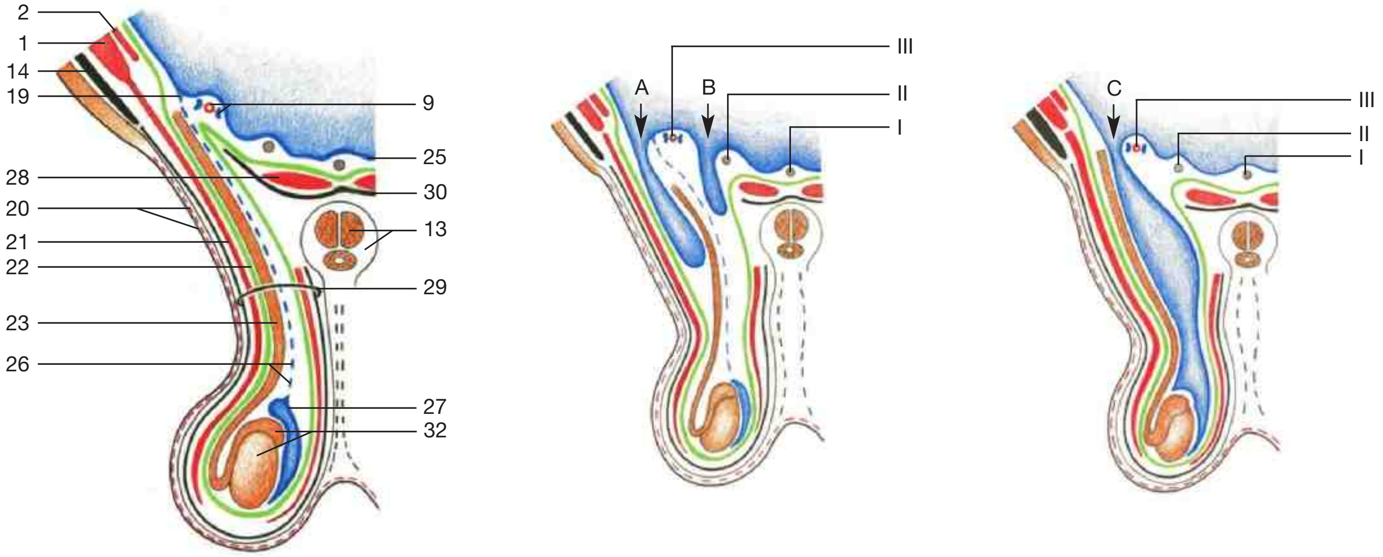
Inguinal and femoral regions in the male (anterior aspect). On the right, the spermatic cord was dissected to display the ductus deferens and the accompanying vessels and nerves. The fascia lata on the left side has been removed.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C
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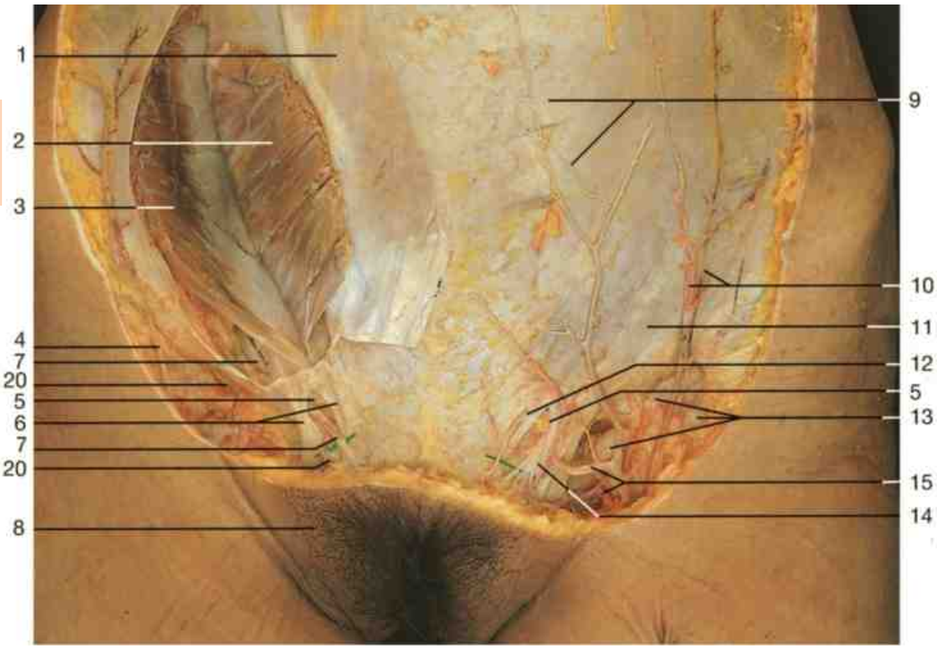
I

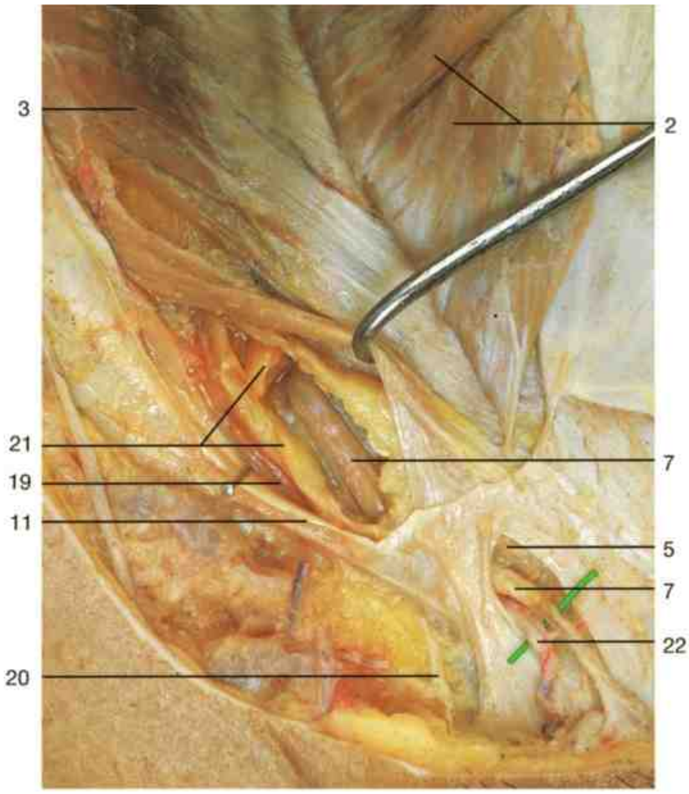
Layers of spermatic cord and types of hernias. Left: normal situation. Middle: location of acquired inguinal hernias: A = indirect; B = direct inguinal hernia. Right: congenital indirect inguinal hernia (C); the vaginal process remained open.

I = median umbilical fold containing urachus chord.
II = medial umbilical fold with remnants of umbilical artery.
III = lateral umbilical fold with inferior epigastric artery and vein.

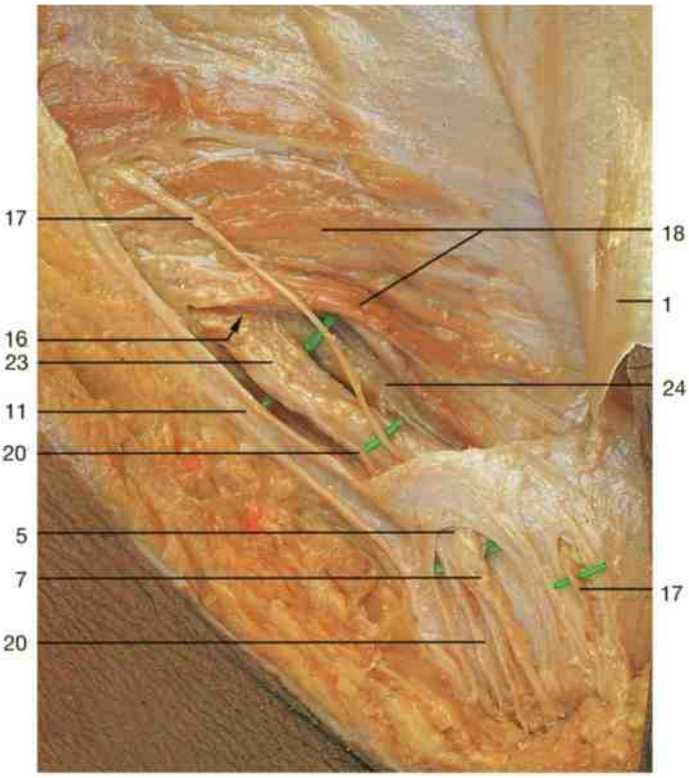


Inguinal region in the female (anterior aspect). Left side: superficial layer; right side: external and internal abdominal oblique muscle divided and reflected.

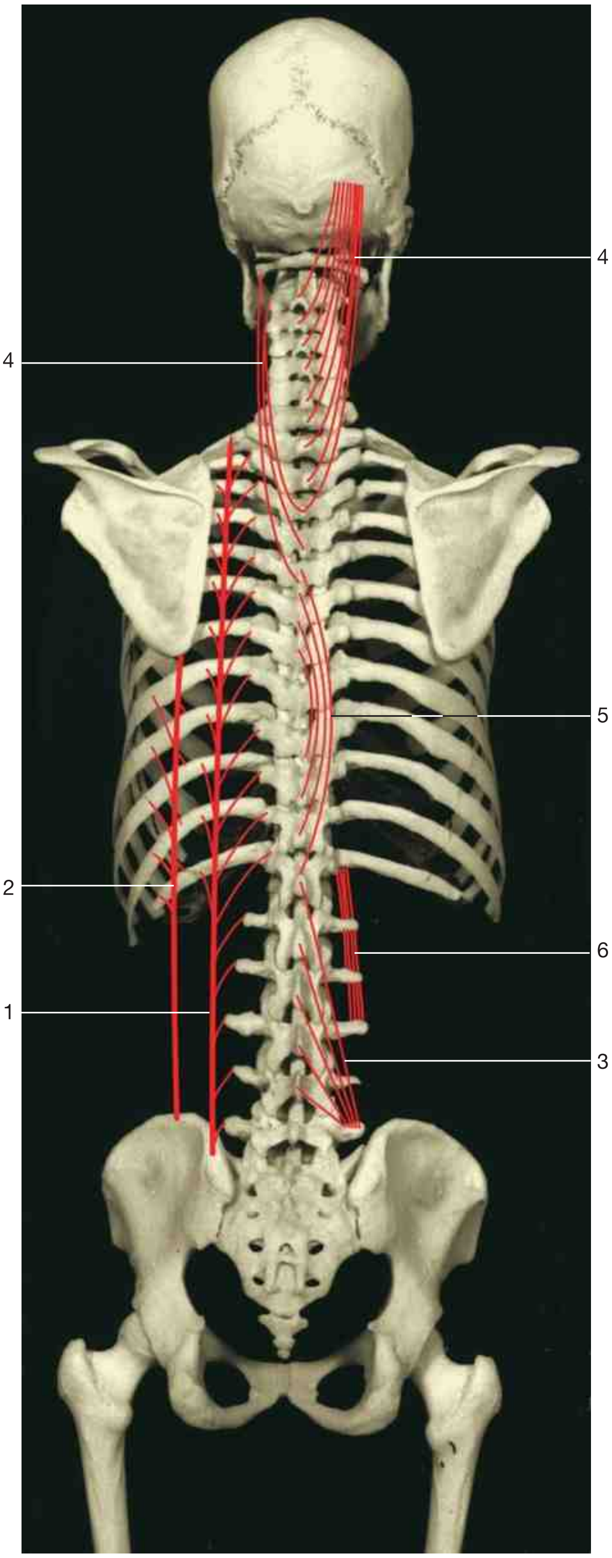
1 Aponeurosis of external abdominal oblique muscle
2 Internal abdominal oblique muscle (divided and reflected)
3 Transversus abdominis muscle
4 Superficial circumflex iliac artery and vein
5 Superficial inguinal ring with fat pad
6 Medial and lateral crural fibers
7 Round ligament (ligamentum teres uteri)
8 Labium majus pudendi
9 Anterior layer of rectus sheath
10 Superficial epigastric artery and vein
11 Inguinal ligament
12 Cutaneous branch of ilio-inguinal nerve
13 Superficial inguinal lymph nodes
14 Entrance of round ligament into the labium majus
15 External pudendal artery and vein
16 Position of deep inguinal ring
17 Ilio-inguinal nerve
18 Internal abdominal oblique muscle
19 Pubic branch of inferior epigastric artery
20 Genital branch of genitofemoral nerve
21 Fat pad of inguinal canal
22 Ilio-inguinal nerve
23 Sheath of round ligament (inguinal canal)
24 Transversalis fascia

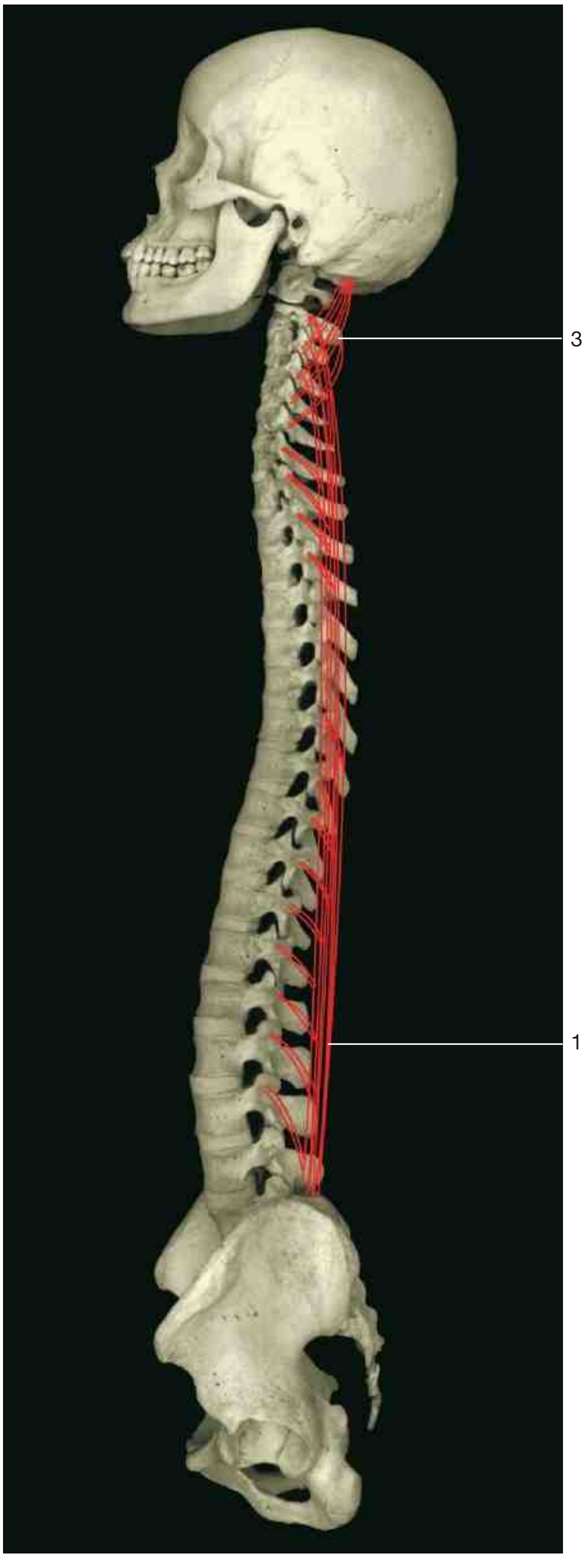


Inguinal canal of the female (anterior aspect, right side). The external abdominal oblique muscle has been divided and reflected, to display the ilio-inguinal nerve and the round ligament.

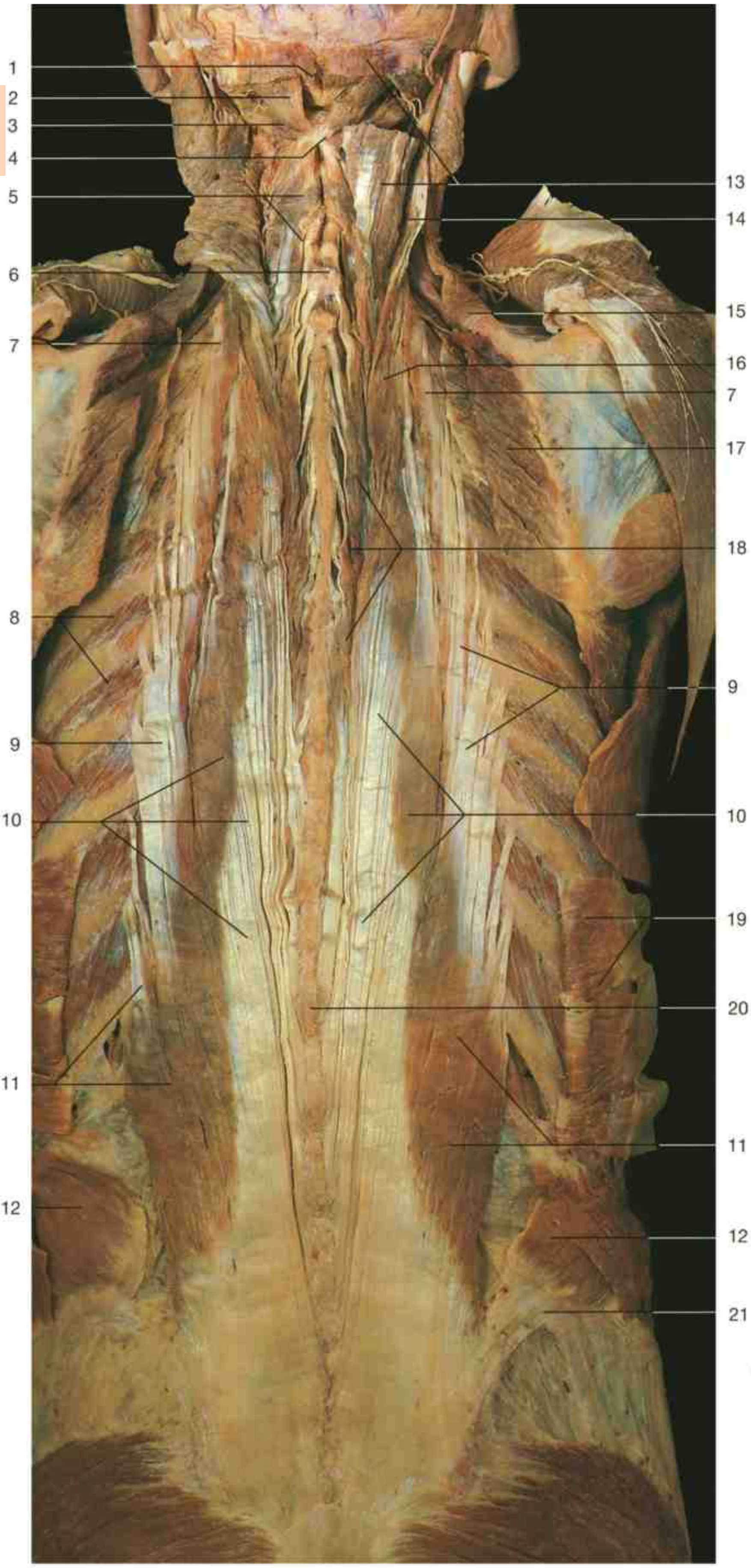


Inguinal canal of the female (anterior aspect, right side). The external and internal abdominal oblique muscle have been divided and reflected to show the content of the inguinal canal.

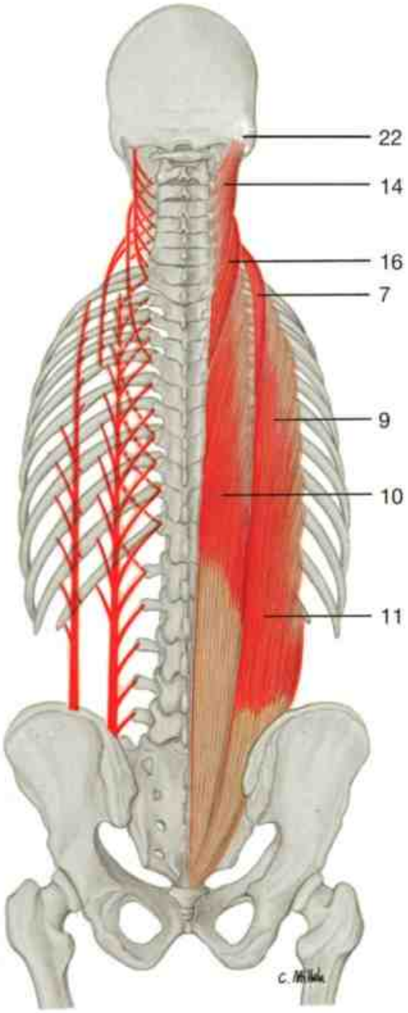




Skeleton of the trunk (dorsal and lateral aspect).
The long muscles of the back [longissimus (1) and iliocostalis (2) muscles] originate at the sacrum and pelvis and insert at the spinous or transverse processes of the vertebrae or at the ribs. There are also muscles that insert at the occipital bone.
The long muscles form the lateral tract, whereas muscles of the medial tract are situated within the groove between the spinous and transverse processes of the vertebrae [transversospinal (3) and spinotransversal (4) muscles] or between the spinous processes [spinalis muscles (5)] or between the transverse processes [intertransversarii muscles (6)] of the vertebrae.

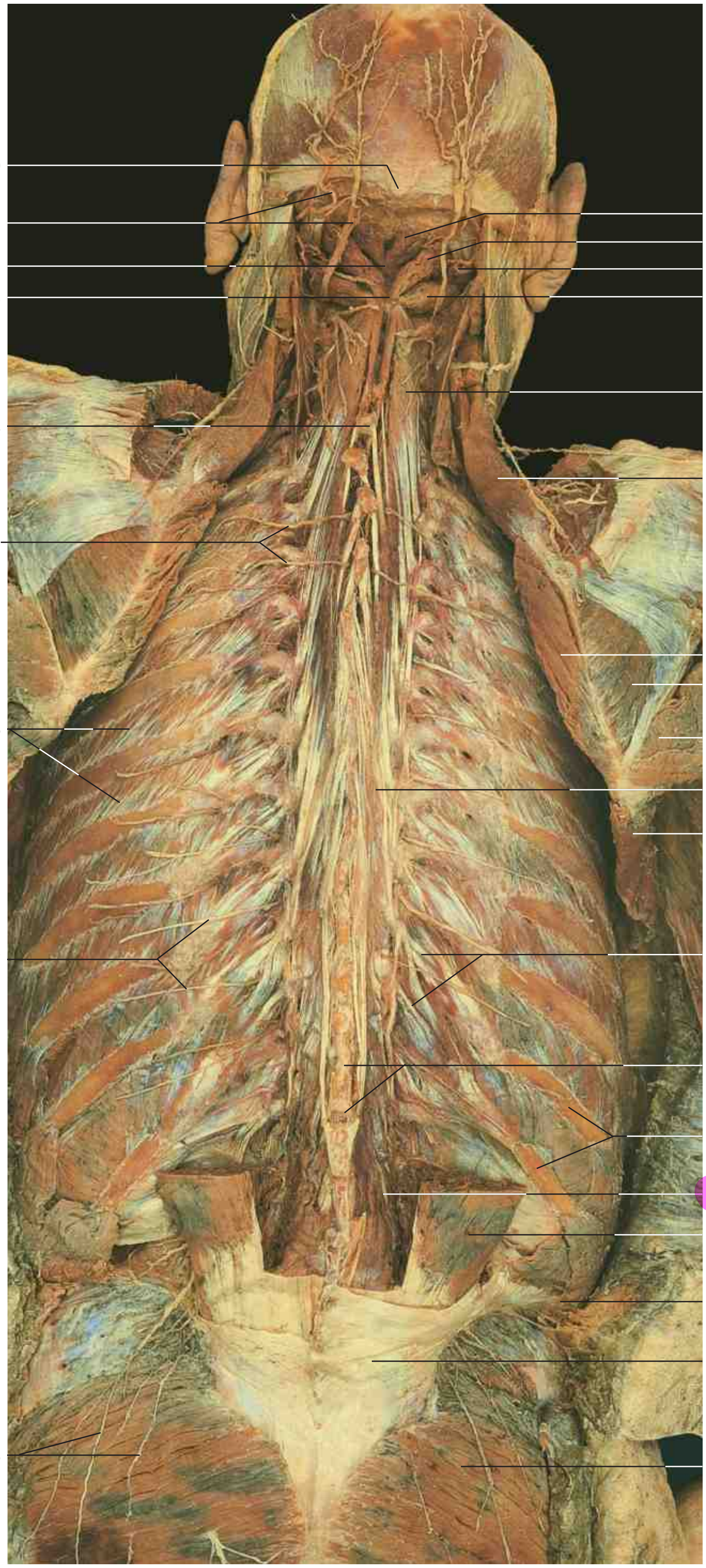


Muscles of the back. Dissection of the erector spinae muscle (lateral column of the intrinsic back muscles).



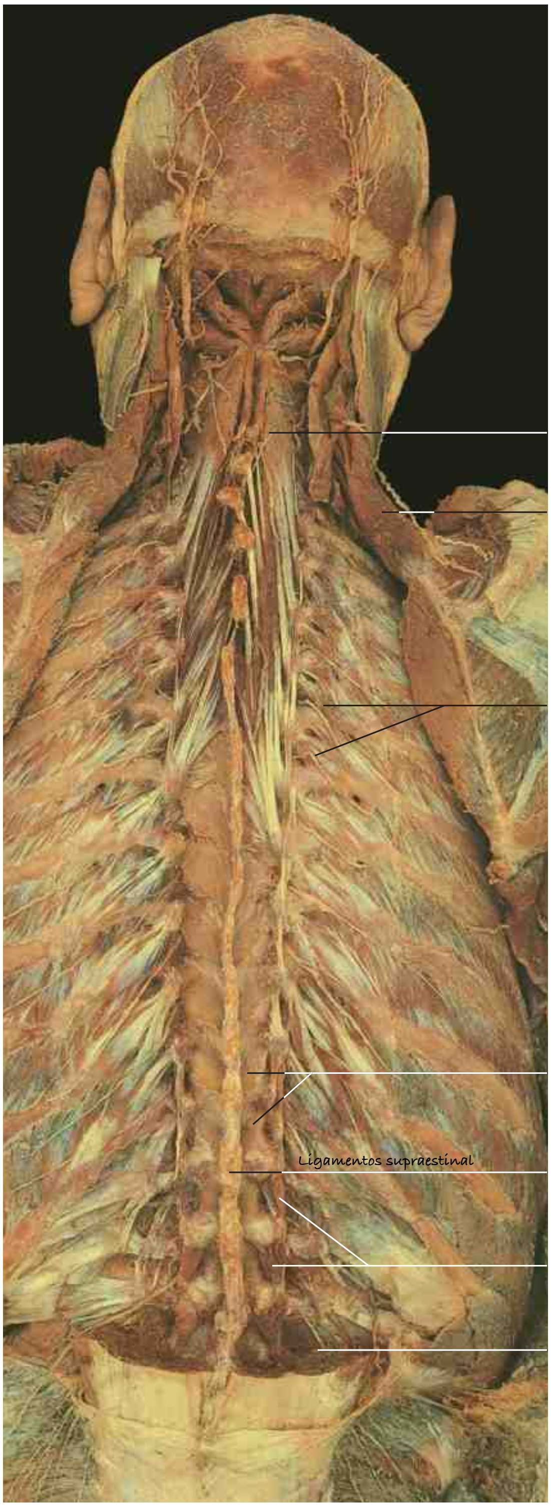
Origin and insertion of iliocostalis and longissimus muscles (schematic drawing).

1	Rectus capitis posterior minor muscle
2	Rectus capitis posterior major muscle
3	Obliquus capitis inferior muscle
4	Spinous process of axis
5	Semispinalis cervicis muscle
6	Spinous process of seventh vertebra
7	Iliocostalis cervicis muscle
8	External intercostal muscles
9	Iliocostalis thoracis muscle
10	Longissimus thoracis muscle
11	Iliocostalis lumborum muscle
12	Internal abdominal oblique muscle
13	Semispinalis capitis muscle (divided)
14	Longissimus capitis muscle
15	Levator scapulae muscle
16	Longissimus cervicis muscle
17	Rhomboid major muscle
18	Spinalis thoracis muscle
19	Serratus posterior inferior muscle (reflected)
20	Spinous process of second lumbar vertebra
21	Iliac crest
22	Mastoid process



Muscles of the back. Dissection of the deeper layer of the intrinsic muscles of the back (longissimus and iliocostalis muscles are cut).

1 Rectus capitis posterior minor muscle
2 Rectus capitis posterior major muscle
3 Obliquus capitis superior muscle
4 Obliquus capitis inferior muscle
5 Semispinalis cervicis muscle
6 Levator scapulae muscle
7 Rhomboideus major muscle
8 Scapula with infraspinatus muscle
9 Teres major muscle
10 Spinalis muscle
11 Latissimus dorsi muscle
12 Levatores costarum muscles
13 Spinous processes of lumbar vertebrae
14 Ribs (Th_{11}, Th_{12})
15 Multifidus muscle
16 Longissimus and iliocostalis muscles (cut)
17 Iliac crest (lumbar triangle)
18 Thoracolumbar fascia
19 Gluteus maximus muscle
20 Protuberantia occipitalis externa
21 Occipital artery and greater occipital nerve (C_2)
22 Posterior tubercle of atlas
23 Spinous process of axis
24 Spinous process of seventh cervical vertebra (vertebra prominens)
25 Medial branches of dorsal branches of spinal nerves
26 External intercostal muscles
27 Lateral branches of dorsal branches of spinal nerves
28 Superior cluneal nerves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Ligamentos supraestinal
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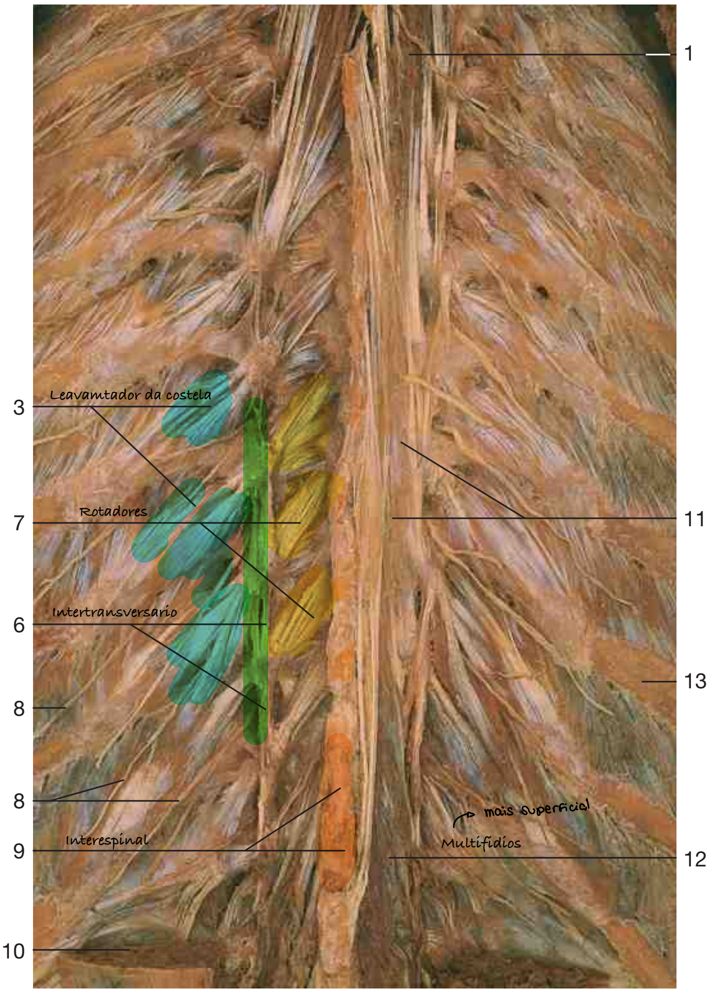
Muscles of the back. Deepest layer.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Leavamtador da costela
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Rotadores
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Intertransversario
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13
mais superficial
Multifidios
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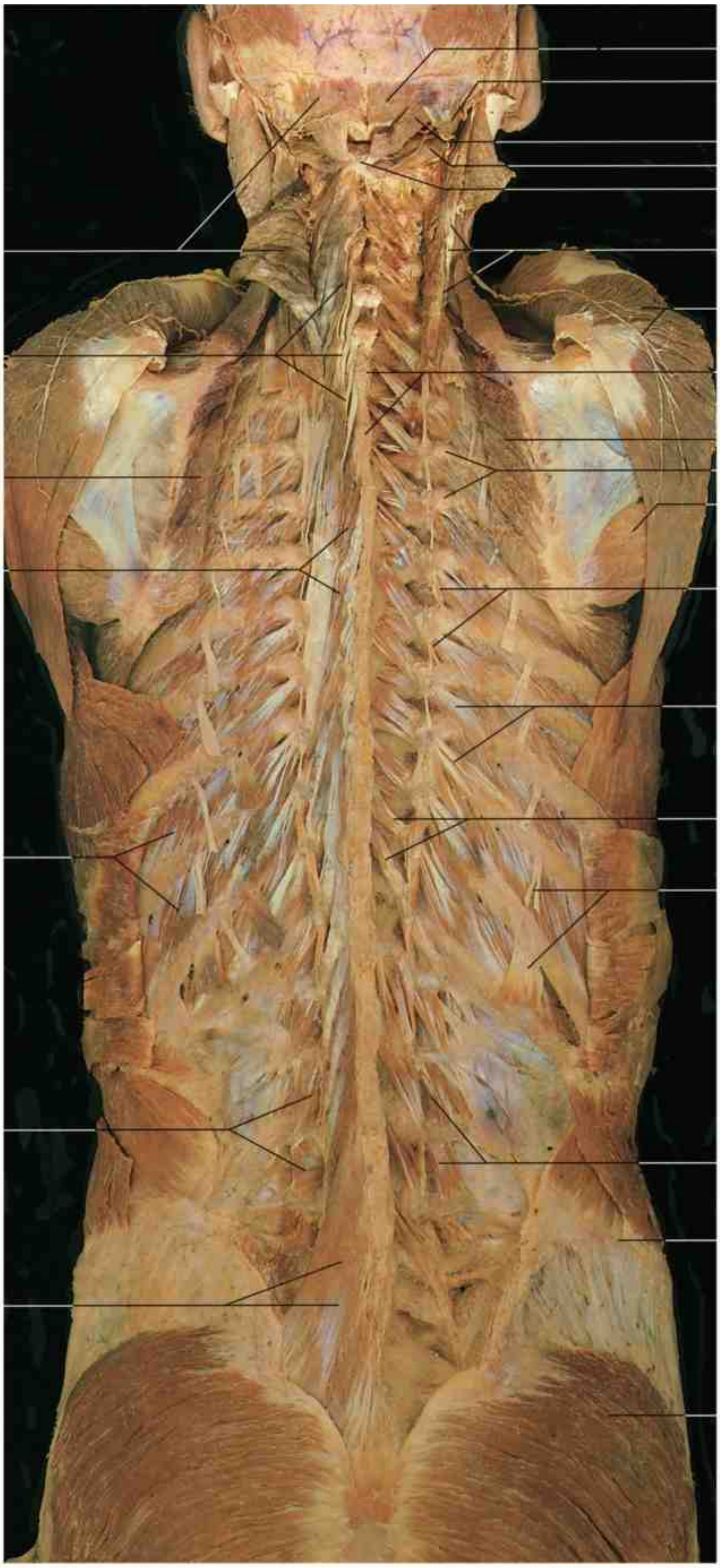
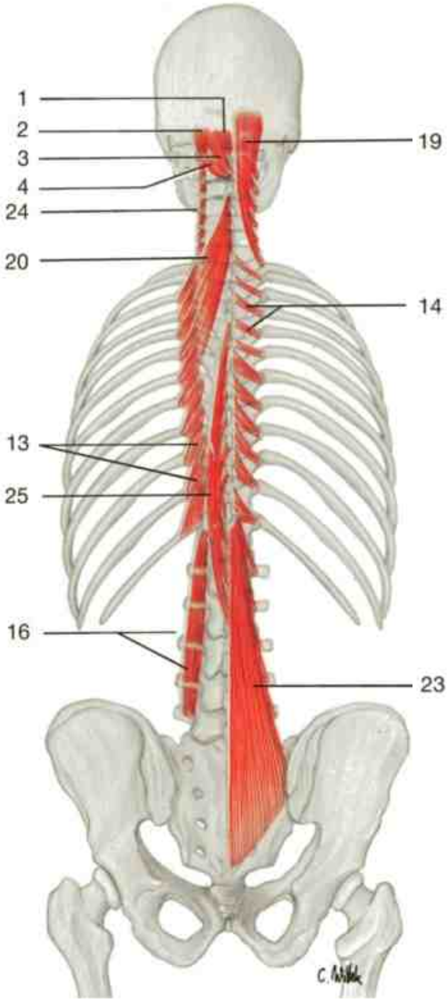
Muscles of the back. Deepest layer. Lumbar region (higher magnification).

1	Semispinalis cervicis muscle
2	Levator scapulae muscle
3	Levatores costarum muscles
4	Vertebral arches of lumbar vertebrae
5	Supraspinal ligaments
6	Intertransverse lumbar muscles
7	Lumbar rotator muscles
8	Cutaneous branches of spinal nerves
9	Lumbar interspinal muscles
10	Longissimus and iliocostalis muscle (cut)
11	Spinal muscle of the back
12	Multifidus muscle
13	Tenth rib (T_{10})

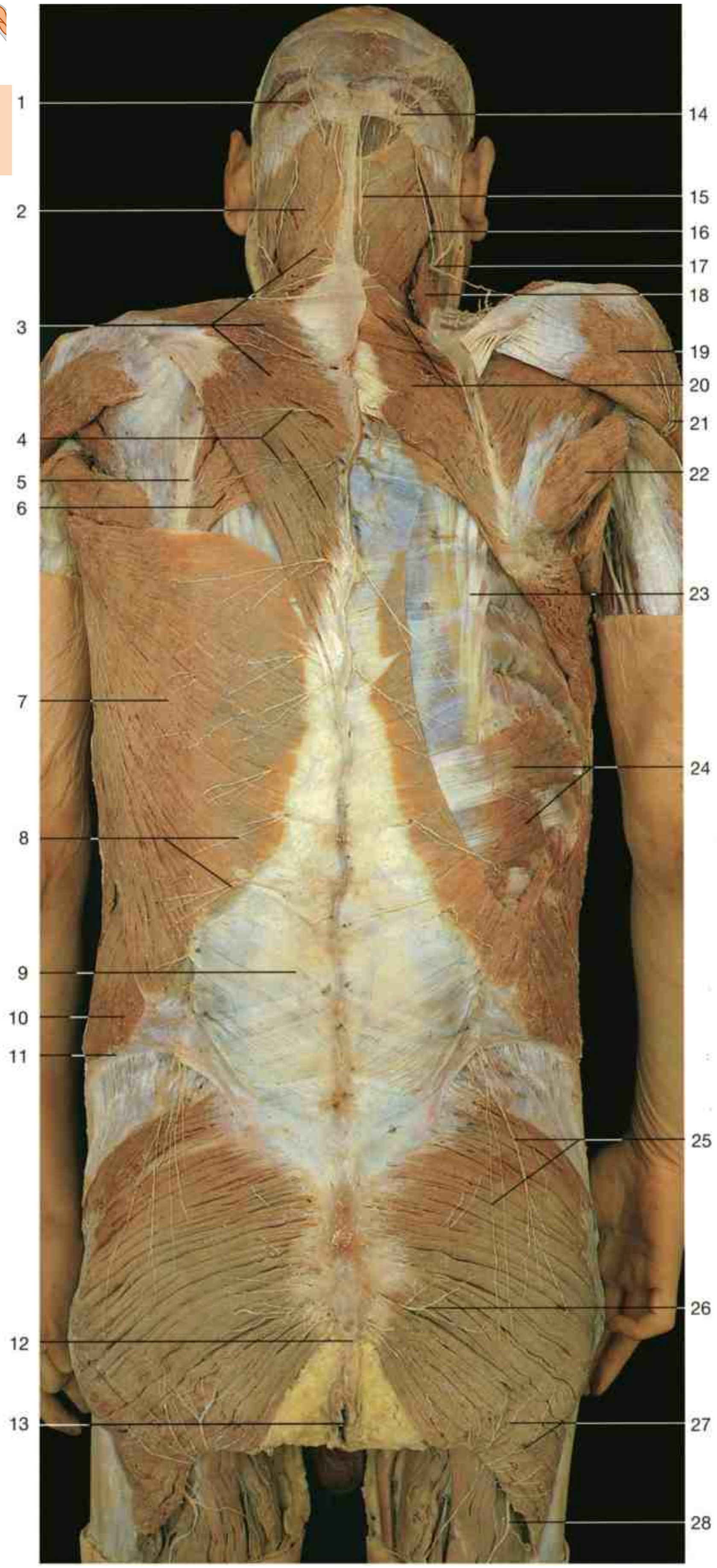


Muscles of the back. Transversospinal muscles, deepest layer on the right, where all parts of semispinalis and multifidus muscles have been removed.



Medial column of intrinsic muscles of the back. Transversospinal and intertransversal system (schematic drawing).

1	Rectus capitis posterior minor muscle
2	Obliquus capitis superior muscle
3	Rectus capitis posterior major muscle
4	Obliquus capitis inferior muscle
5	Spinous process of axis
6	Longissimus capitis muscle
7	Trapezius muscle (reflected) and accessory nerve (n. XI)
8	Spinous processes
9	Rhomboid major muscle
10	Transverse processes of thoracic vertebrae
11	Teres major muscle
12	Intertransverse ligaments
13	Levatores costarum muscles
14	Rotatores muscles
15	Tendons of iliocostalis muscle
16	Intertransversarii lumborum muscles (lateral)
17	Iliac crest
18	Gluteus maximus muscle
19	Semispinalis capitis muscle
20	Semispinalis cervicis muscle
21	Semispinalis thoracis muscle
22	External intercostal muscles
23	Multifidus muscle
24	Posterior cervical intertransversarii muscles
25	Spinalis thoracis muscle

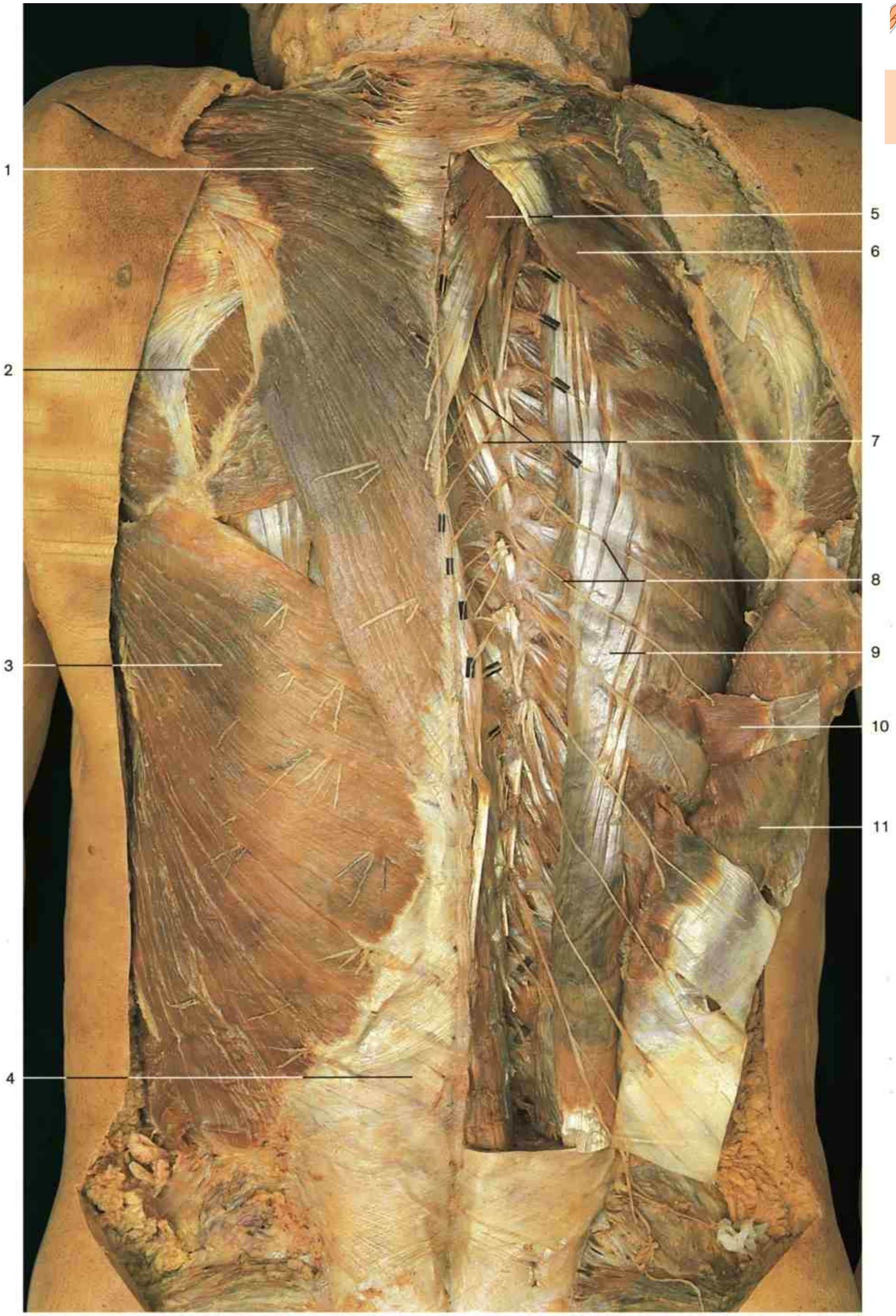


Innervation of the back. Superficial (left) and deeper (right) layers. Right trapezius and latissimus dorsi muscles removed.

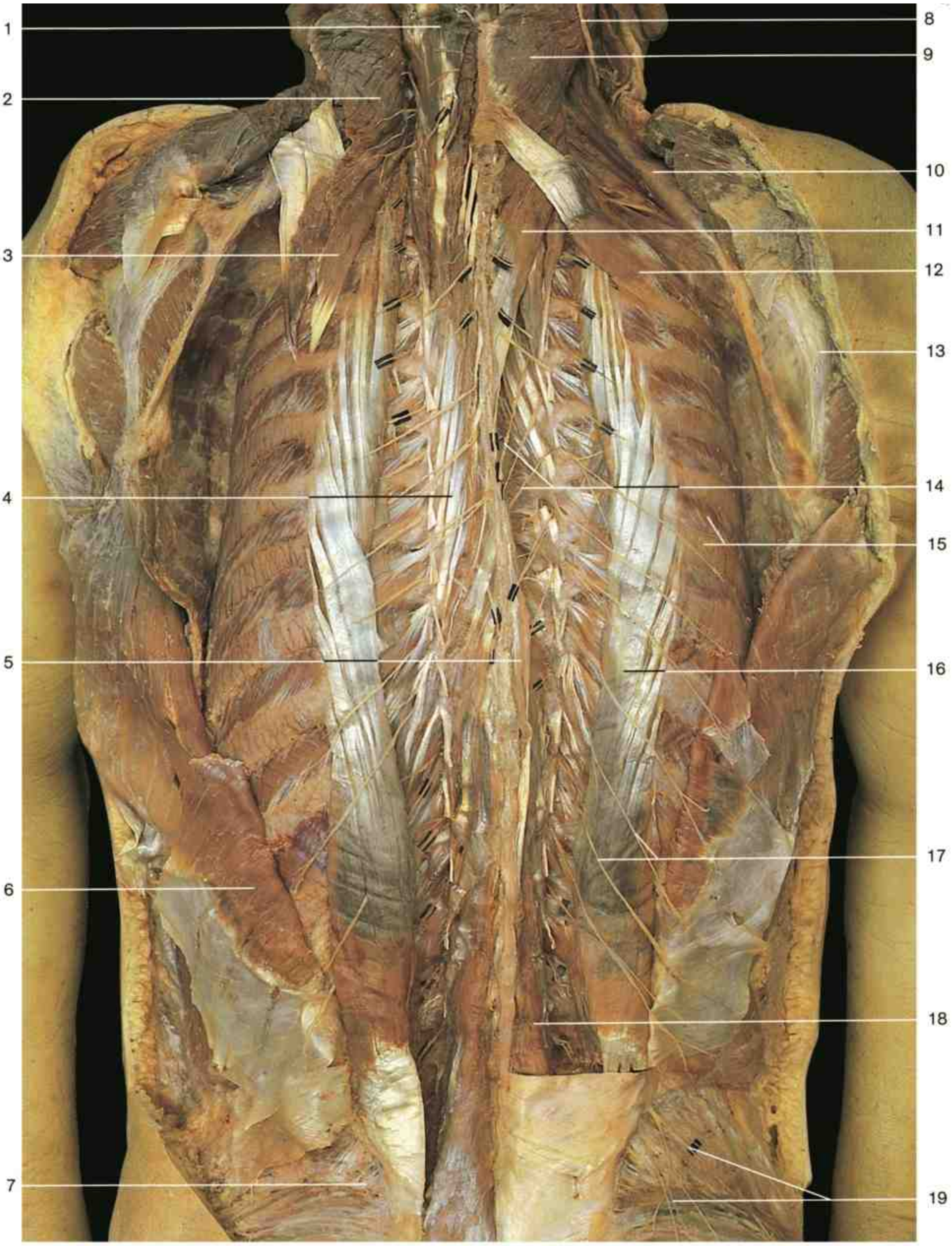
1 Occipital belly of occipitofrontalis muscle
2 Splenius capitis muscle
3 Trapezius muscle
4 Medial cutaneous branches of dorsal rami of spinal nerves
5 Medial margin of scapula
6 Rhomboid major muscle
7 Latissimus dorsi muscle
8 Lateral cutaneous branches of dorsal rami of spinal nerves
9 Thoracolumbar fascia
10 External abdominal oblique muscle
11 Iliac crest
12 Last coccygeal vertebra
13 Anus
14 Greater occipital nerve
15 Third occipital nerve
16 Lesser occipital nerve
17 Cutaneous branches of cervical plexus
18 Levator scapulae muscle
19 Deltoid muscle
20 Rhomboid major and minor muscles
21 Upper lateral cutaneous nerve of arm (branch of axillary nerve)
22 Teres major muscle
23 Iliocostalis thoracis muscle
24 Serratus posterior inferior muscle
25 Superior cluneal nerves
26 Middle cluneal nerves
27 Inferior cluneal nerves
28 Posterior femoral cutaneous nerve

▷ **To page 227:**

1 Trapezius muscle
2 Infraspinatus muscle
3 Left latissimus dorsi muscle
4 Thoracolumbar fascia
5 Splenius cervicis muscle
6 Serratus posterior superior muscle
7 Medial branches of dorsal rami of thoracic spinal nerves
8 Lateral branches of dorsal rami of thoracic spinal nerves
9 Iliocostalis muscle
10 Serratus posterior inferior muscle
11 Latissimus dorsi muscle (reflected)



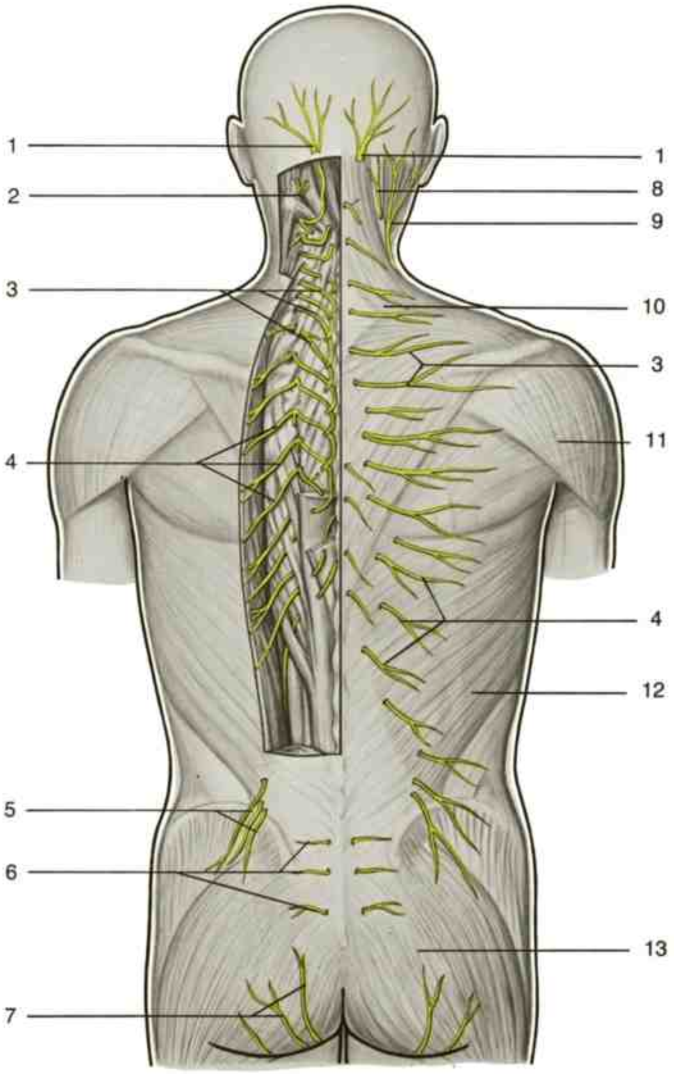
Innervation of the back. Dissection of the dorsal branches of spinal nerves. On the right, longissimus thoracis muscle has been removed and iliocostalis muscle laterally reflected.



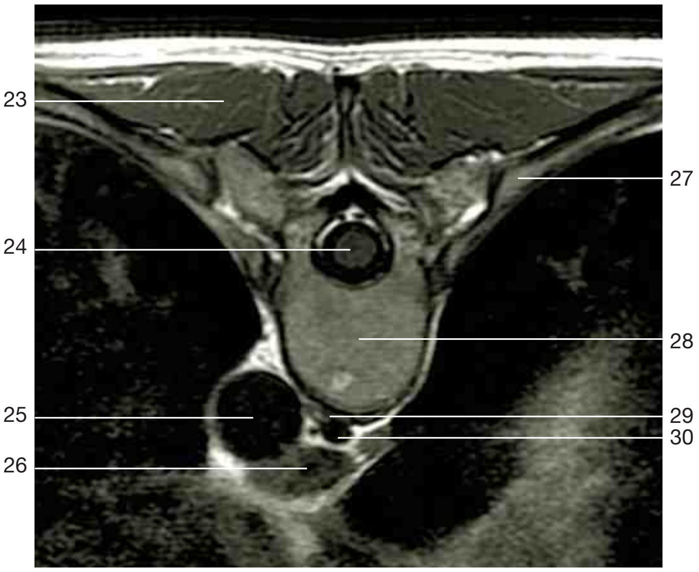
Innervation of the back. Deeper layer (dorsal aspect).

1	Semispinalis capitis muscle	7	Iliac crest	14	Medial branches of dorsal rami of spinal nerves
2	Left splenius capitis muscle (cut and reflected)	8	Lesser occipital nerve	15	Rib and external intercostal muscle
3	Left splenius cervicis muscle (cut and reflected)	9	Splenius capitis muscle	16	Iliocostalis thoracis muscle
4	Semispinalis thoracis muscle	10	Levator scapulae muscle	17	Lateral branches of dorsal rami of spinal nerves
5	Spinalis thoracis muscle	11	Splenius cervicis muscle	18	Multifidus muscle
6	Latissimus dorsi muscle (reflected)	12	Serratus posterior superior muscle	19	Superior cluneal nerves
		13	Scapula		

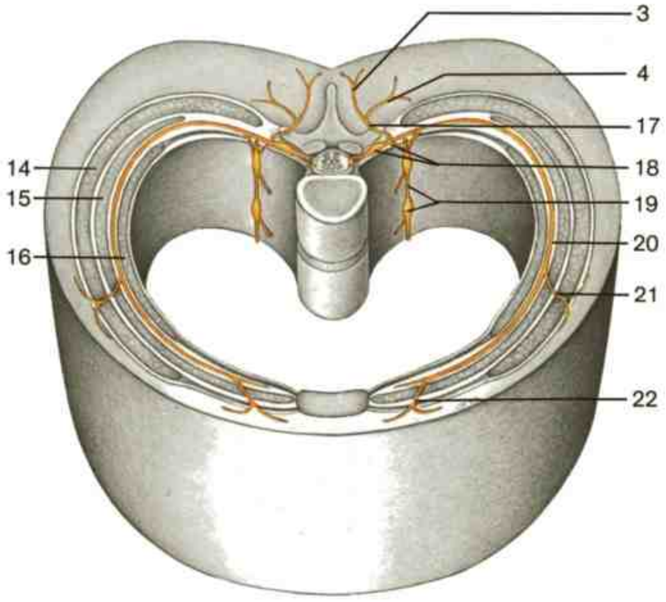
1 Greater occipital nerve (C_2)
2 Suboccipital nerve (C_1)
3 Medial branches of dorsal rami of spinal nerves
4 Lateral branches of dorsal rami of spinal nerves
5 Superior cluneal nerves (L_1–L_3)
6 Middle cluneal nerves (S_1–S_3)
7 Inferior cluneal nerves (derived from branches of the sacral plexus, ventral rami)
8 Lesser occipital nerve
9 Great auricular nerve
10 Trapezius muscle
11 Deltoid muscle
12 Latissimus dorsi muscle
13 Gluteus maximus muscle
14 External intercostal muscle
15 Internal intercostal muscle
16 Innermost intercostal muscle
17 Dorsal ramus of spinal nerve
18 Spinal nerve and spinal ganglion
19 Sympathetic trunk with ganglion
20 Intercostal nerve
21 Lateral cutaneous branch } of intercostal nerve
22 Anterior cutaneous branch } of intercostal nerve
23 Longissimus thoracis muscle
24 Spinal cord
25 Aorta
26 Esophagus
27 Body of rib
28 Thoracic rib
29 Thoracic duct
30 Azygos vein



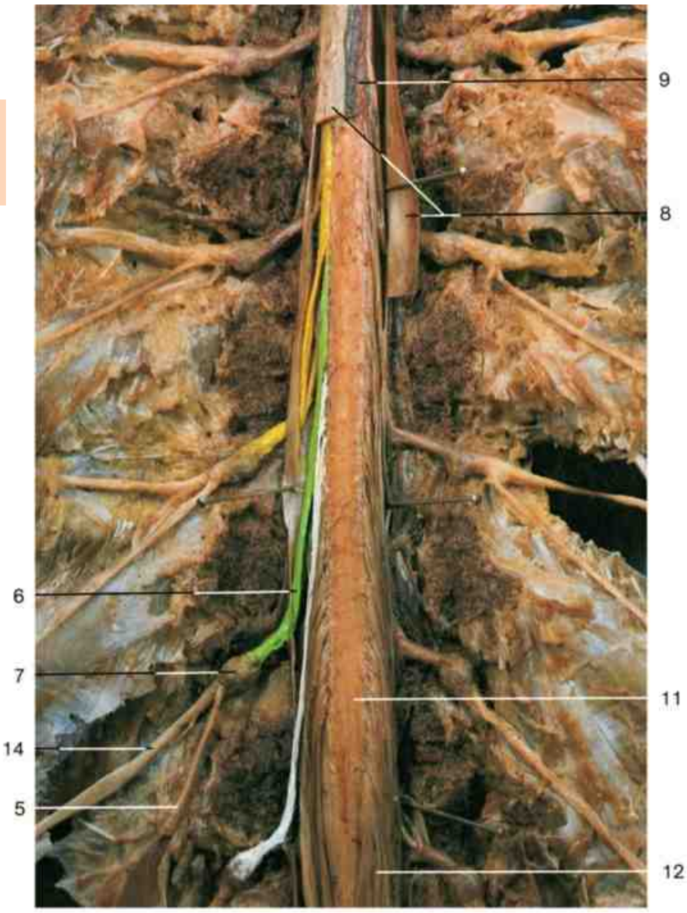
General characteristics of the innervation of the back. Distribution of dorsal branches of spinal nerves. Note the segmental arrangement of the innervation of the dorsal part of the trunk (schematic drawing).



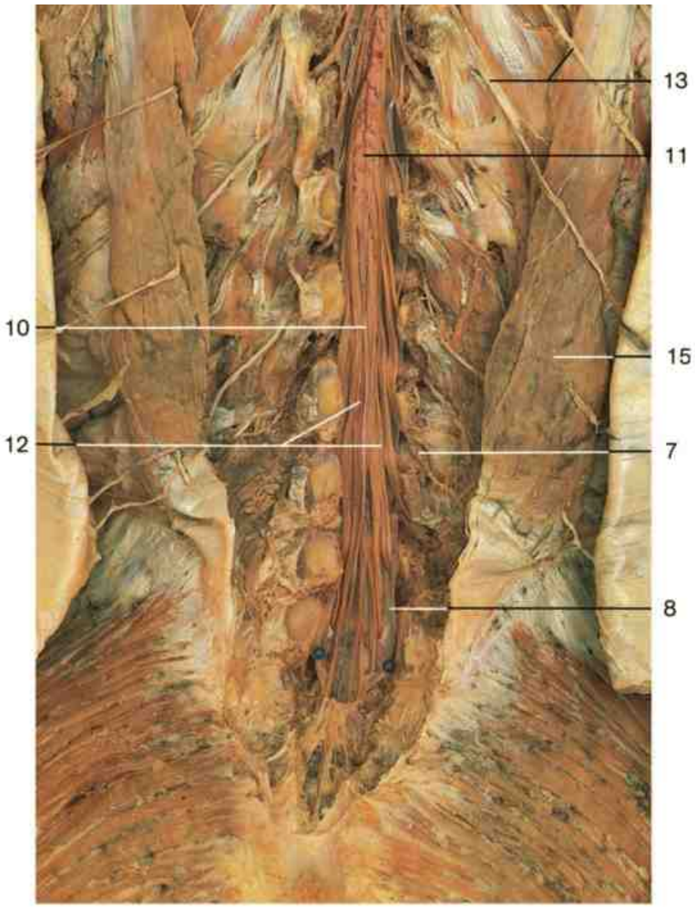
Posterior part of the thoracic wall (MRI scan, coronal section; from Heuck et al., MRT-Atlas, 2009).



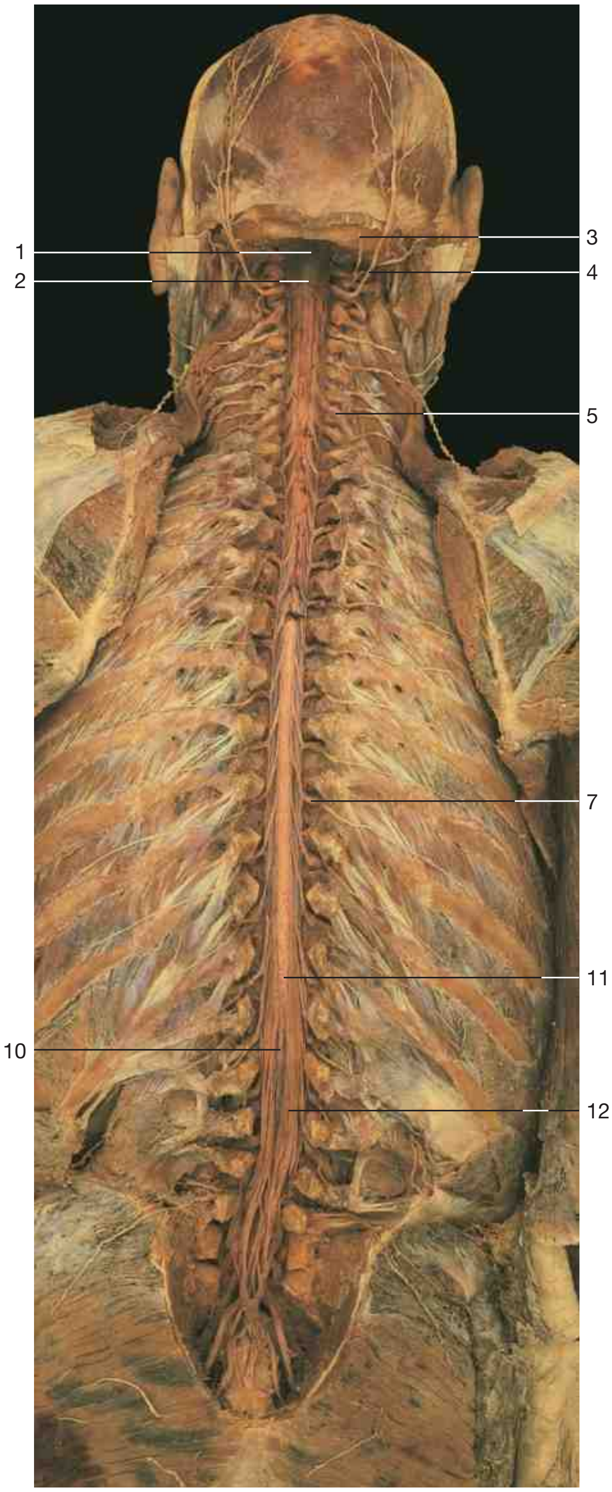
Position and branches of spinal nerves in one segment of thoracic wall (schematic drawing).



Lumbar portion of spinal cord. Note the relation between the nervous and muscular segments.

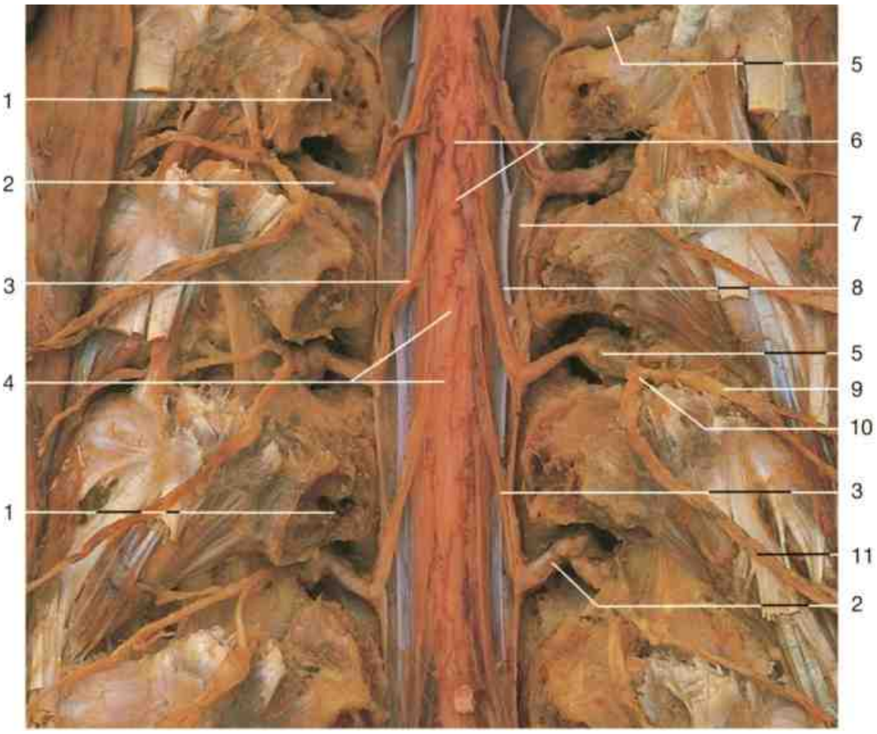


Terminal part of spinal cord. Dura removed.



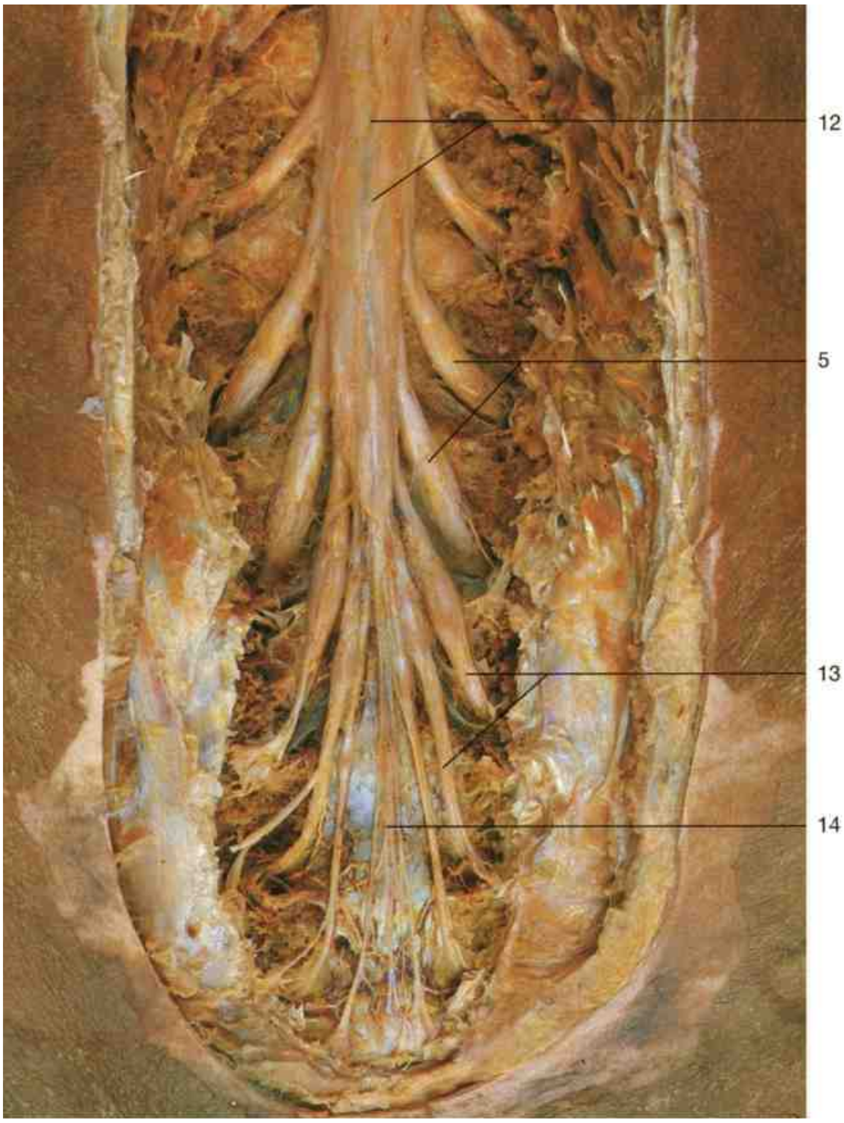
Innervation of the back. Spinal cord in the vertebral canal (opened). Longissimus dorsi and iliocostal muscles have been removed.

1 Cerebellomedullary cistern
2 Medulla oblongata
3 Third cervical nerve (C_3)
4 Greater occipital nerve (C_2)
5 Dorsal primary ramus
6 Dorsal roots
7 Spinal ganglion
8 Spinal dura mater
9 Spinal arachnoid mater
10 Filum terminale
11 Conus medullaris
12 Cauda equina
13 Lateral branches of dorsal rami of spinal nerves
14 Ventral ramus of spinal nerve (intercostal nerve)
15 Iliocostalis muscle

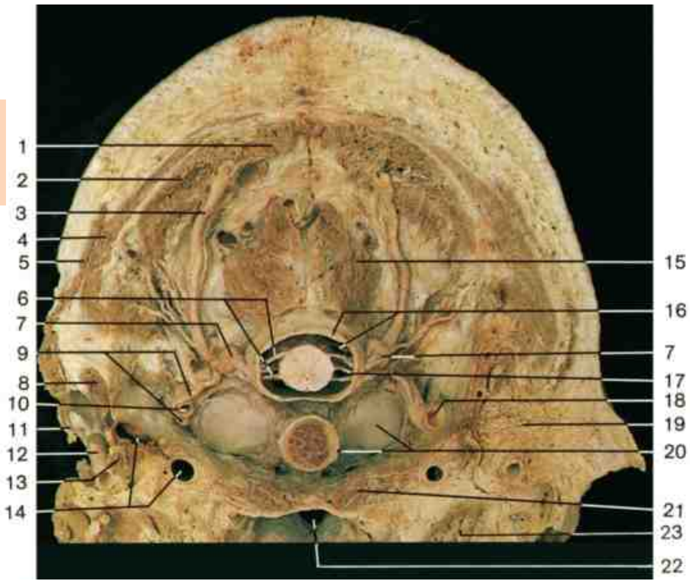


Thoracic portion of spinal cord (dorsal aspect). Vertebral canal and dura mater opened.

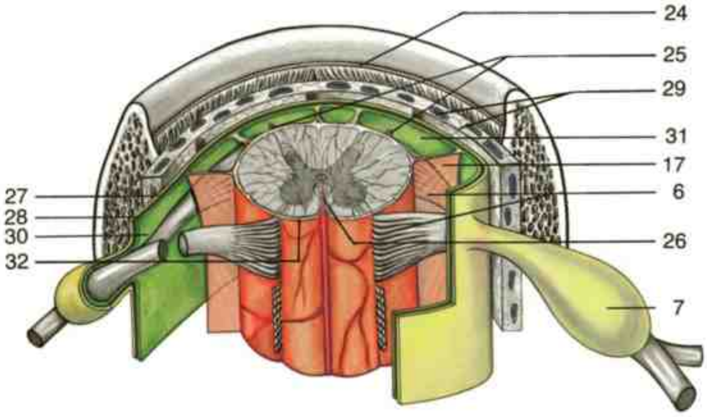
1 Arch of vertebra (divided)
2 Spinal nerve with meningeal coverings
3 Dorsal roots of thoracic spinal nerves
4 Spinal cord (thoracic portion)
5 Spinal ganglia with meningeal coverings
6 Pia mater with blood vessels
7 Dura mater (opened)
8 Denticulate ligament
9 Lateral branch of dorsal ramus
10 Dorsal ramus of spinal nerve (dividing into a medial and lateral branch)
11 Medial branch of dorsal ramus of spinal nerve
12 Spinal dura mater
13 Spinal nerves of sacral segments
14 Filum terminale



Terminal part of spinal cord with dura mater (dorsal aspect). Dorsal part of sacrum removed.



Horizontal section of the neck. Dissection of the second cervical spinal nerve. Posterior surface at top of figure.

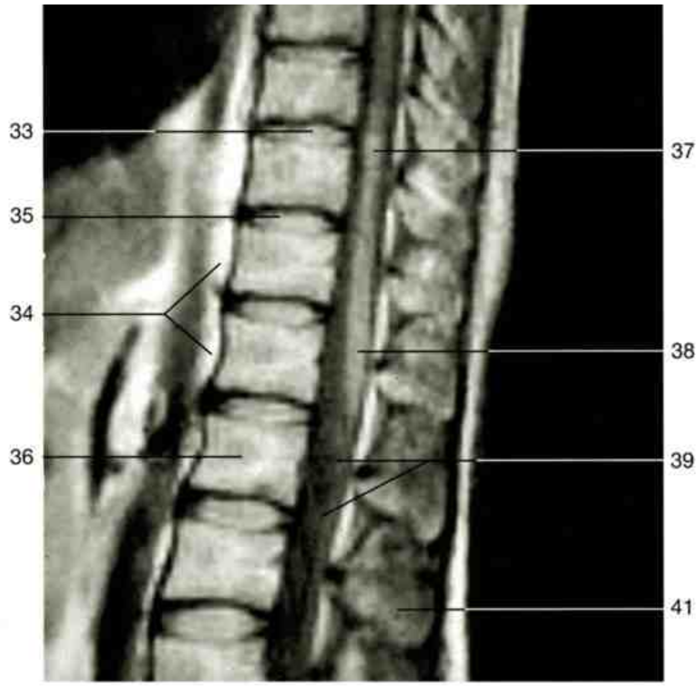


Meningeal coverings of the spinal cord (anterior aspect). (Schematic drawing.)

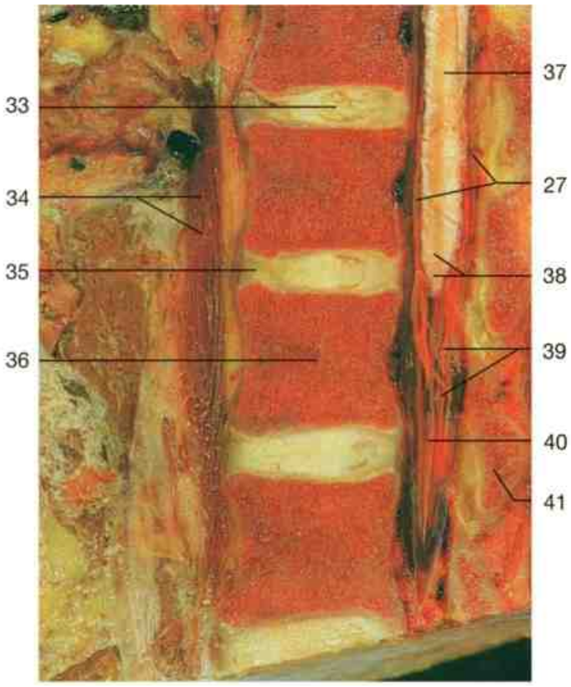
1 Trapezius muscle
2 Semispinalis capitis muscle
3 Dorsal ramus of spinal nerve
4 Sternocleidomastoid muscle
5 Platysma muscle
6 Dorsal and ventral roots of spinal nerves
7 Spinal ganglion
8 Posterior belly of digastric muscle
9 Ventral ramus of spinal nerve
10 Vertebral artery
11 Great auricular nerve
12 Superficial temporal artery
13 Styloid process
14 Internal jugular vein and internal carotid artery
15 Rectus capitis posterior major muscle
16 Dura mater and subarachnoid space
17 Denticulate ligament
18 Vertebral artery
19 Parotid gland
20 Dens of axis (divided) and inferior articular facet of atlas
21 Longus capitis muscle
22 Pharyngeal cavity
23 Medial pterygoid muscle
24 Periosteum of vertebral canal
25 Posterior spinal arteries
26 Anterior spinal artery

Meningeal coverings

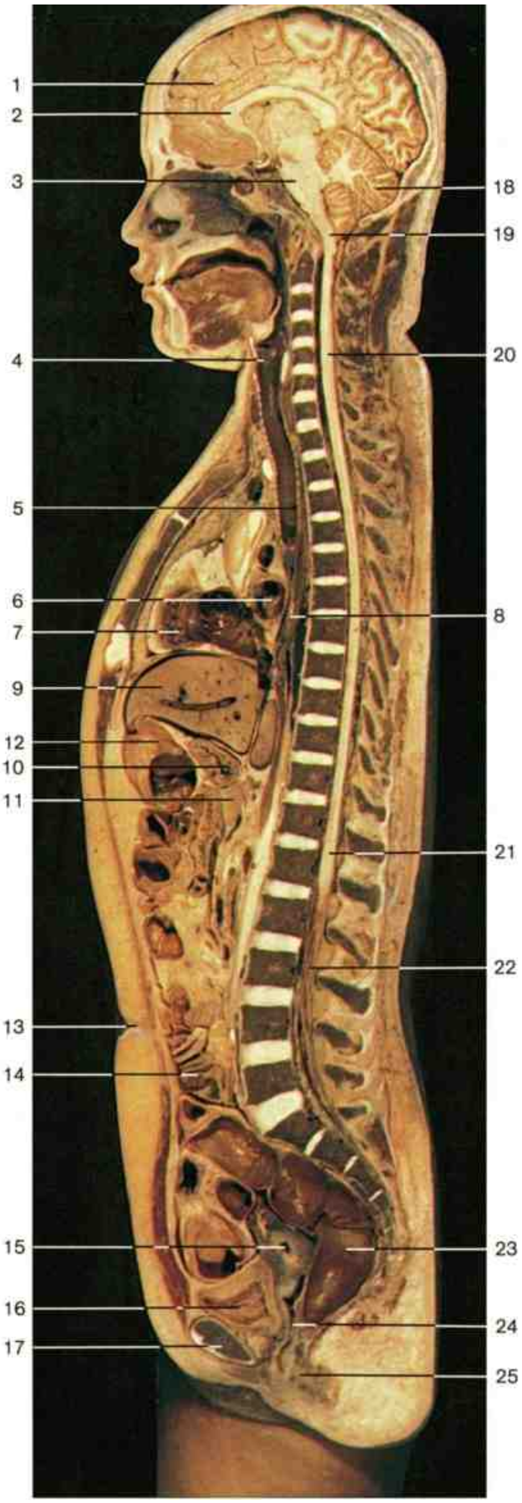
27 Dura mater
28 Subdural space
29 Extradural or epidural space with venous plexus and fatty tissue
30 Arachnoid (green)
31 Subarachnoid space
32 Pia mater (pink)
33 Nucleus pulposus
34 Crus of diaphragm
35 Intervertebral disc
36 Body of first lumbar vertebra
37 Spinal cord
38 Conus medullaris
39 Cauda equina
40 Filum terminale
41 Spinous process



Sagittal section through the vertebral canal, T_9–L_2. (MRI scan.)



Sagittal section through the vertebral canal, T_{12}–L_2. Notice red bone marrow (unfixed).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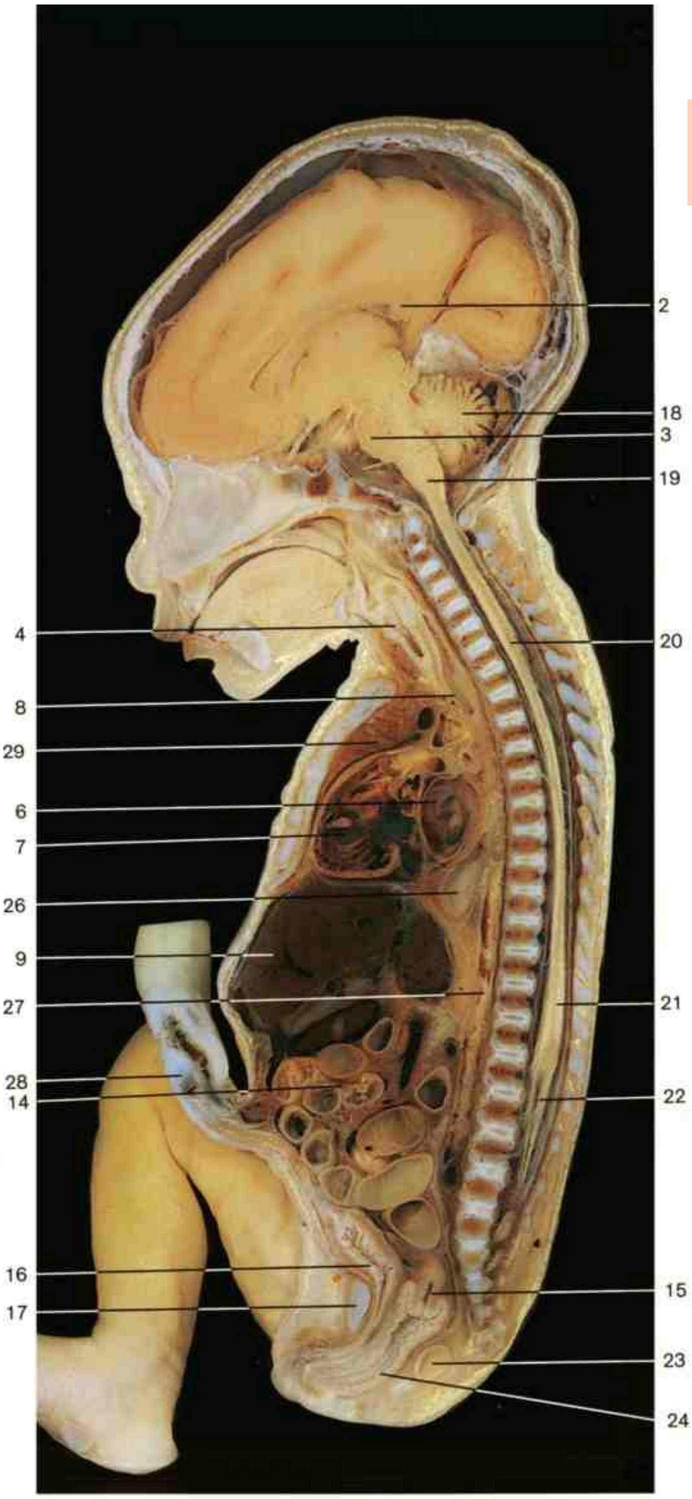
Median section of the head and trunk in the adult (female). The conus medullaris of the spinal cord is located at the level of L_1.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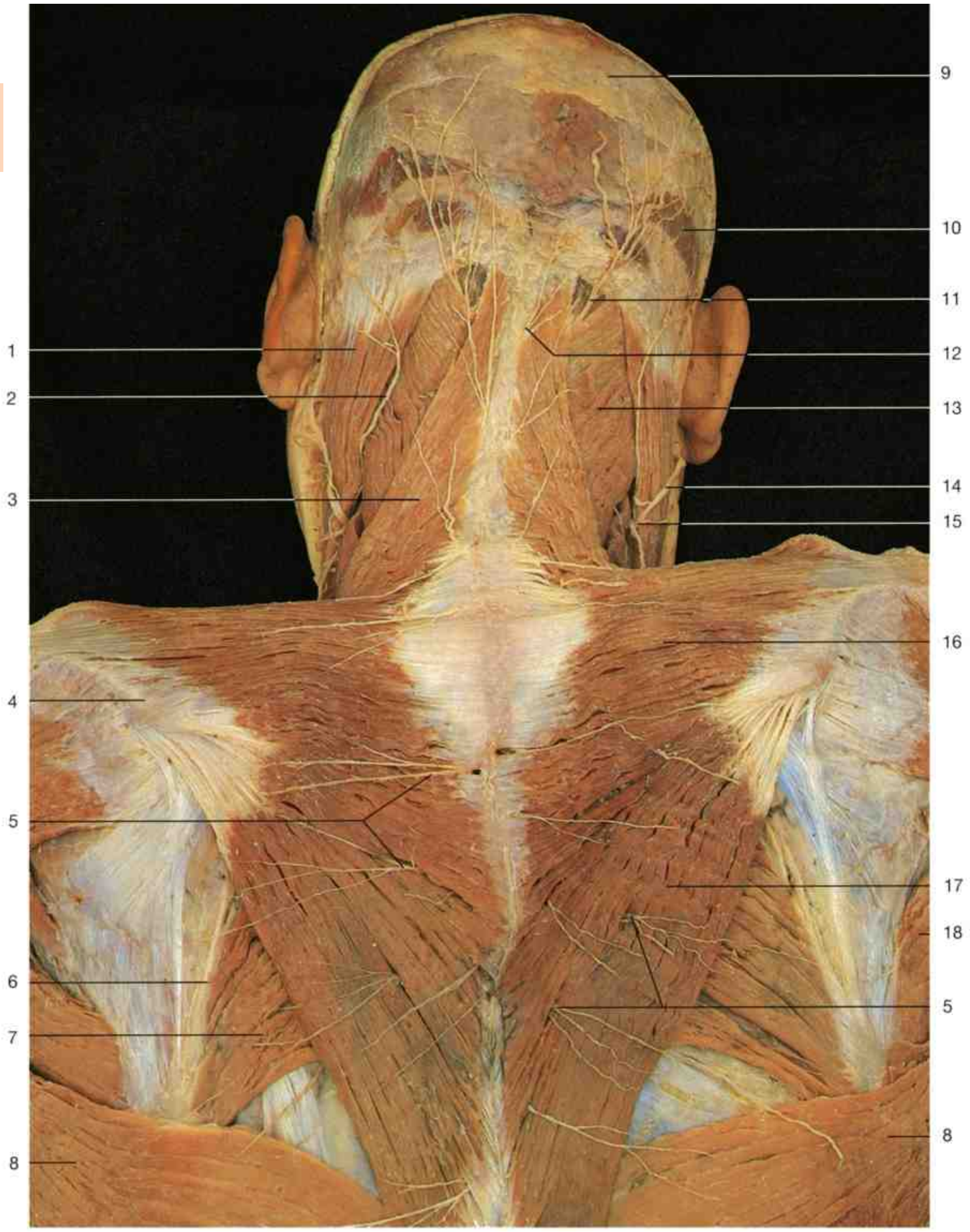
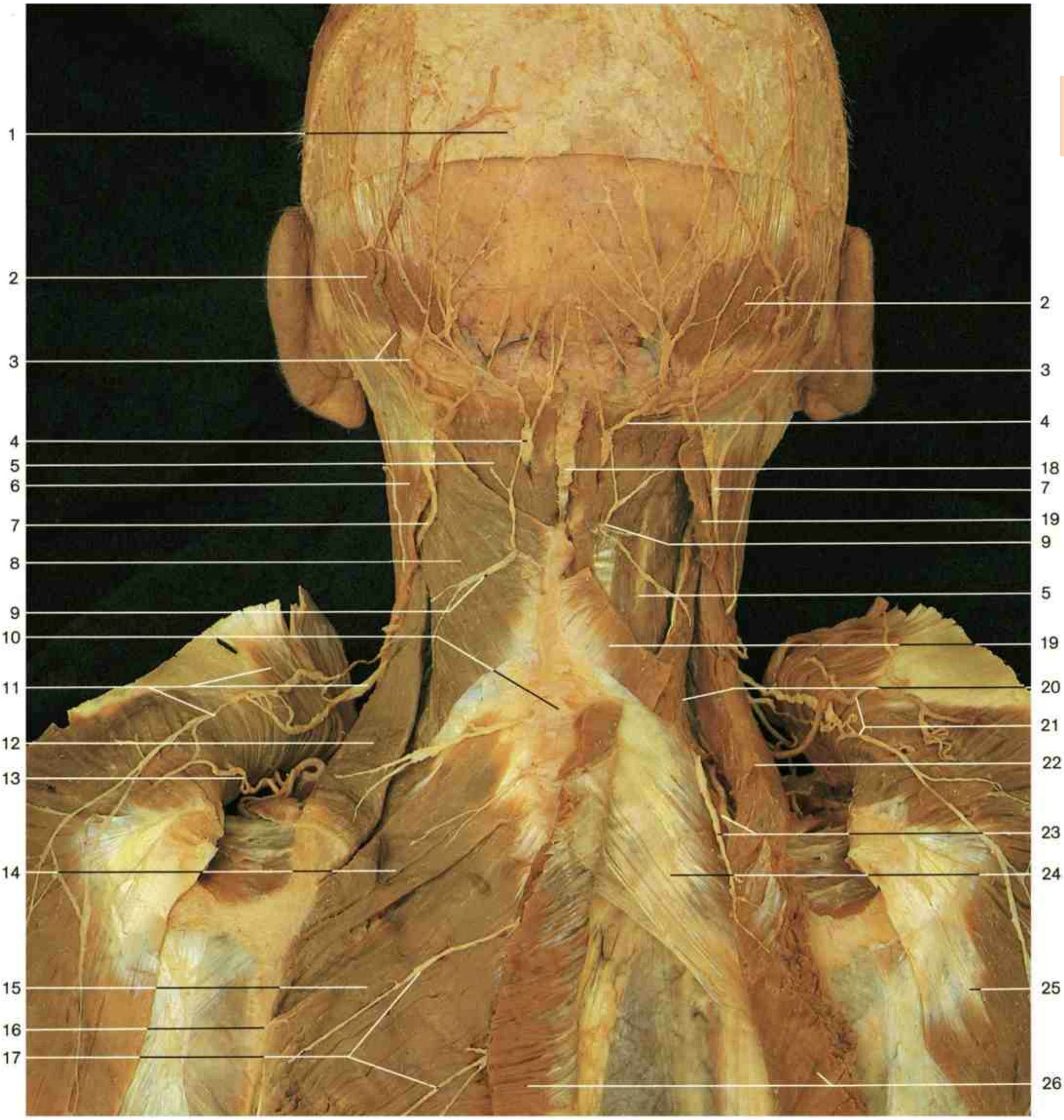
Median section of the head and trunk in the neonate. Note that in the neonate the conus medullaris of the spinal cord extends far more caudally than in the adult.

1	Cerebrum
2	Corpus callosum
3	Pons
4	Larynx
5	Trachea
6	Left atrium
7	Right ventricle
8	Esophagus
9	Liver
10	Stomach
11	Pancreas
12	Transverse colon
13	Umbilicus
14	Small intestine
15	Uterus
16	Urinary bladder
17	Pubic symphysis
18	Cerebellum
19	Medulla oblongata
20	Spinal cord
21	Conus medullaris
22	Cauda equina
23	Rectum
24	Vagina
25	Anus
26	Inferior vena cava
27	Aorta
28	Umbilical cord
29	Thymus



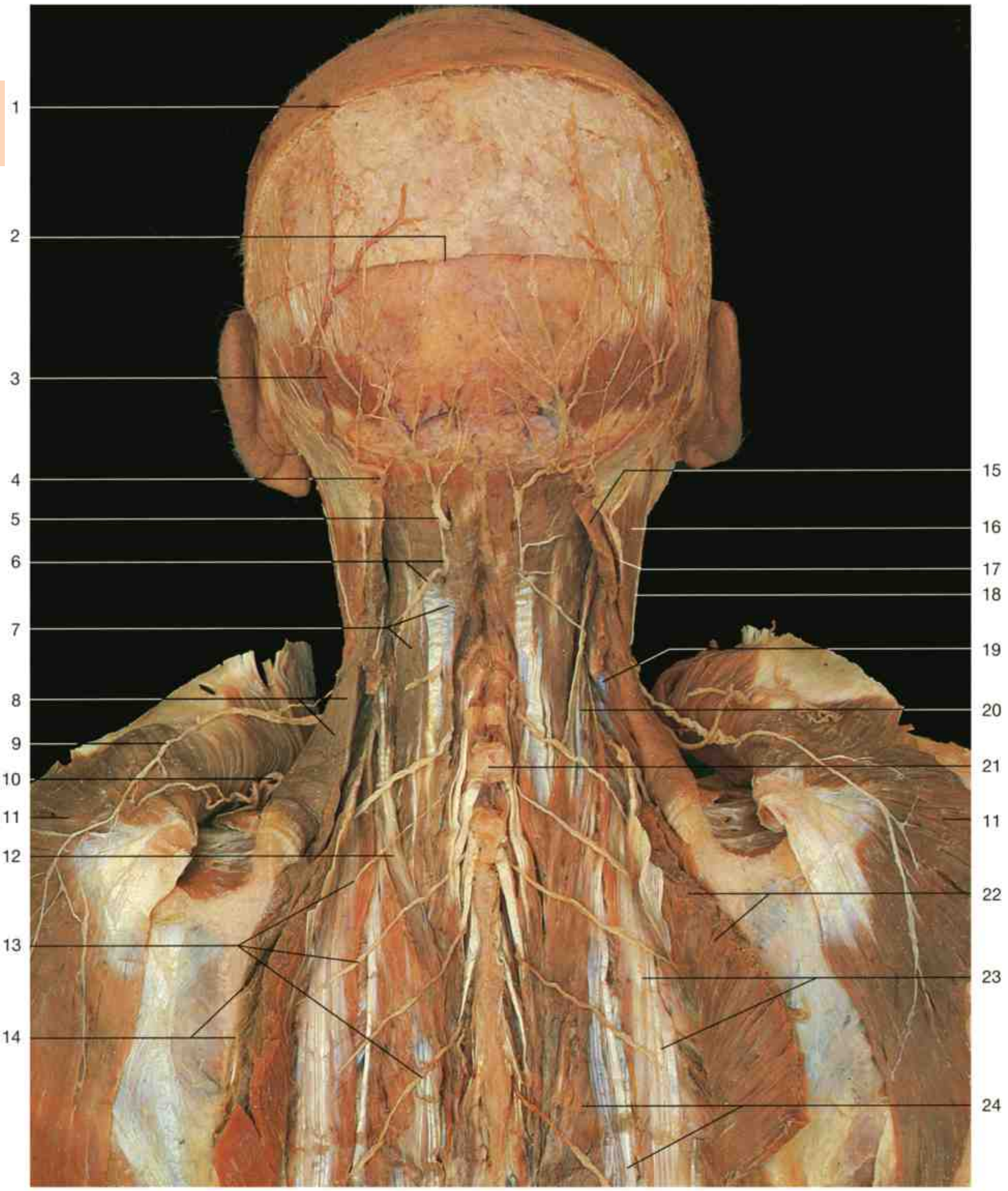
Dorsal aspect of the neck (superficial layer). Nuchal region and shoulder.

1 Sternocleidomastoid muscle
2 Lesser occipital nerve
3 Descending fibers of trapezius muscle
4 Spine of scapula
5 Medial cutaneous branches of dorsal rami of spinal nerves
6 Medial margin of scapula
7 Rhomboid major muscle
8 Latissimus dorsi muscle
9 Galea aponeurotica
10 Occipital belly of occipitofrontalis muscle
11 Greater occipital nerve
12 Third occipital nerve
13 Splenius capitis muscle
14 Great auricular nerve
15 Cutaneous nerves of cervical plexus
16 Transverse fibers of trapezius muscle
17 Ascending fibers of trapezius muscle
18 Teres major muscle



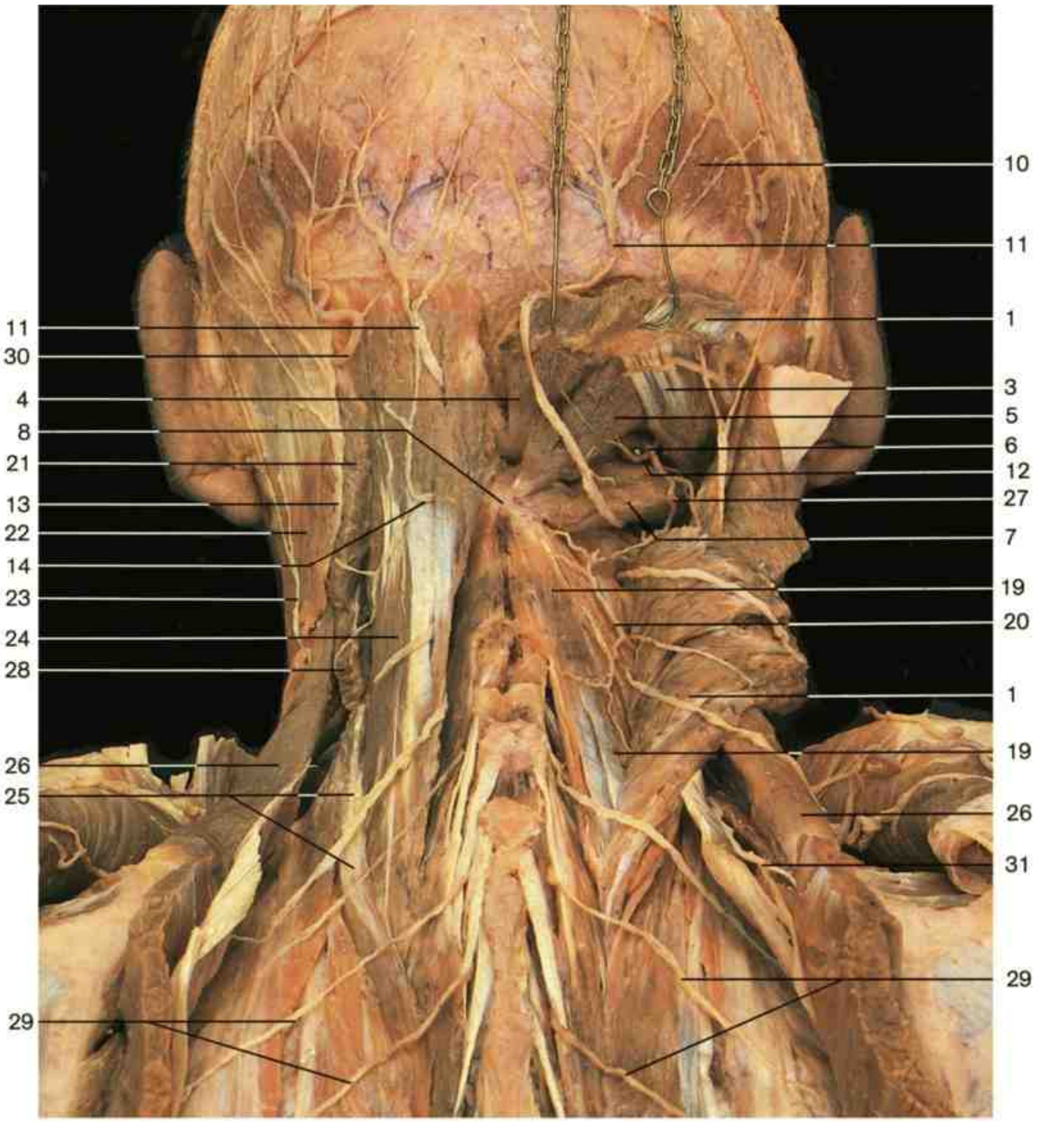
Dorsal aspect of the neck (deeper layer). The left trapezius muscle has been divided and reflected. On the right, trapezius, rhomboid, and splenius muscles have been divided. Right levator scapulae muscle has been slightly reflected.

1	Galea aponeurotica	11	Left trapezius muscle and accessory nerve	20	Splenius cervicis muscle
2	Occipital belly of occipitofrontalis muscle	12	Levator scapulae muscle	21	Right accessory nerve and superficial branch of transverse cervical artery
3	Occipital artery	13	Superficial branch of transverse cervical artery	22	Right levator scapulae muscle
4	Greater occipital nerve (C_2)	14	Rhomboid minor muscle	23	Dorsal scapular nerve and deep branch of transverse cervical artery
5	Semispinalis capitis muscle	15	Rhomboid major muscle	24	Serratus posterior superior muscle
6	Sternocleidomastoid muscle	16	Medial margin of scapula	25	Right trapezius muscle (divided and reflected)
7	Lesser occipital nerve	17	Medial branches of dorsal rami of spinal nerves	26	Right rhomboid major muscle (divided and reflected)
8	Left splenius capitis muscle	18	Ligamentum nuchae		
9	Third occipital nerve (C_3)	19	Splenius capitis muscle (divided)		
10	Spinous process of vertebra prominens (C_7)				



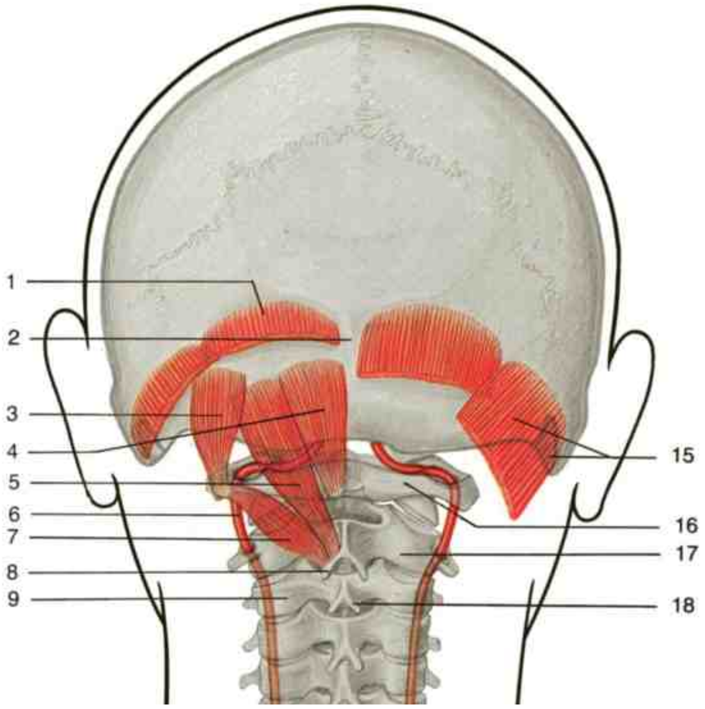
Dorsal aspect of the neck (deepest layer). Trapezius, splenius capitis, and cervicis muscles have been divided and partly removed or reflected.

1 Skin of scalp
2 Galea aponeurotica
3 Occipital belly of occipitofrontalis muscle
4 Occipital artery
5 Greater occipital nerve
6 Third occipital nerve
7 Semispinalis capitis muscle
8 Levator scapulae muscle
9 Accessory nerve (n. XI)
10 Superficial cervical artery
11 Trapezius muscle (reflected)
12 Longissimus cervicis muscle
13 Medial cutaneous branches of dorsal rami of spinal nerves
14 Medial margin of scapula
15 Splenius capitis muscle (divided)
16 Sternocleidomastoid muscle
17 Lesser occipital nerve
18 Great auricular nerve
19 Splenius cervicis muscle
20 Longissimus cervicis muscle
21 Spinous process of seventh cervical vertebra (vertebra prominens)
22 Rhomboid muscles (divided)
23 Iliocostalis thoracis muscle
24 Longissimus thoracis muscle

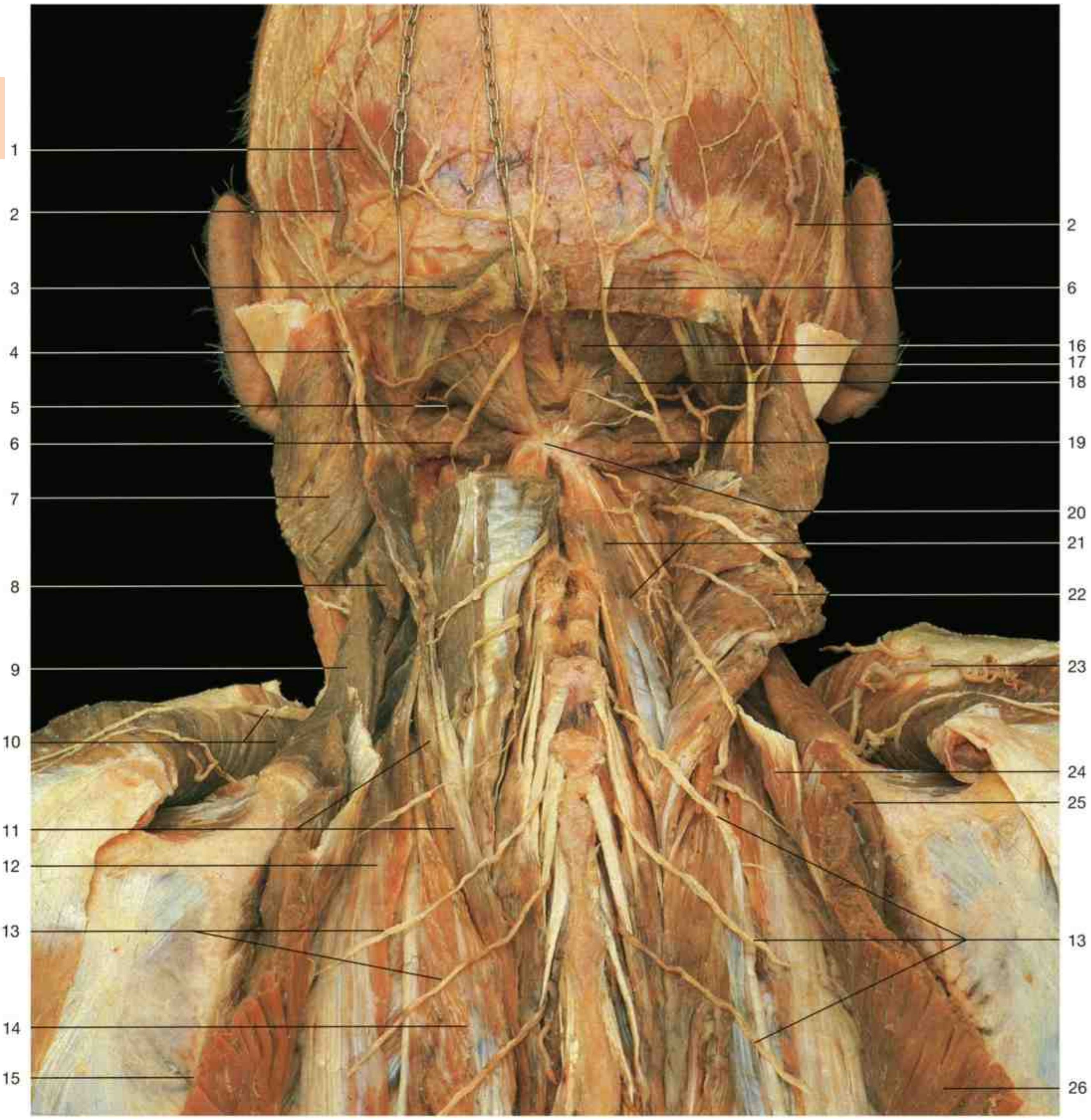


Dorsal aspect of the neck (deepest layer). **Suboccipital triangle.** Right semispinalis capitis muscle divided and reflected.

1	Semispinalis capitis muscle (divided)
2	External occipital protuberance
3	Obliquus capitis superior muscle
4	Rectus capitis posterior minor muscle
5	Rectus capitis posterior major muscle
6	Vertebral artery
7	Obliquus capitis inferior muscle
8	Spinous process of axis
9	Third cervical vertebra
10	Occipital belly of occipitofrontalis muscle
11	Greater occipital nerve
12	Suboccipital nerve (C_1)
13	Lesser occipital nerve
14	Third occipital nerve (C_3)
15	Mastoid process and splenius capitis muscle
16	Atlas
17	Axis
18	Spinous process of third cervical vertebra
19	Right semispinalis cervicis muscle
20	Deep cervical artery
21	Left splenius capitis muscle (divided)
22	Left sternocleidomastoid muscle
23	Great auricular nerve
24	Left semispinalis capitis muscle
25	Left longissimus cervicis muscle
26	Levator scapulae muscle
27	Muscular branch of vertebral artery
28	Left semispinalis cervicis muscle (divided)
29	Medial branches of dorsal rami of spinal nerves
30	Occipital artery
31	Dorsal scapular nerve

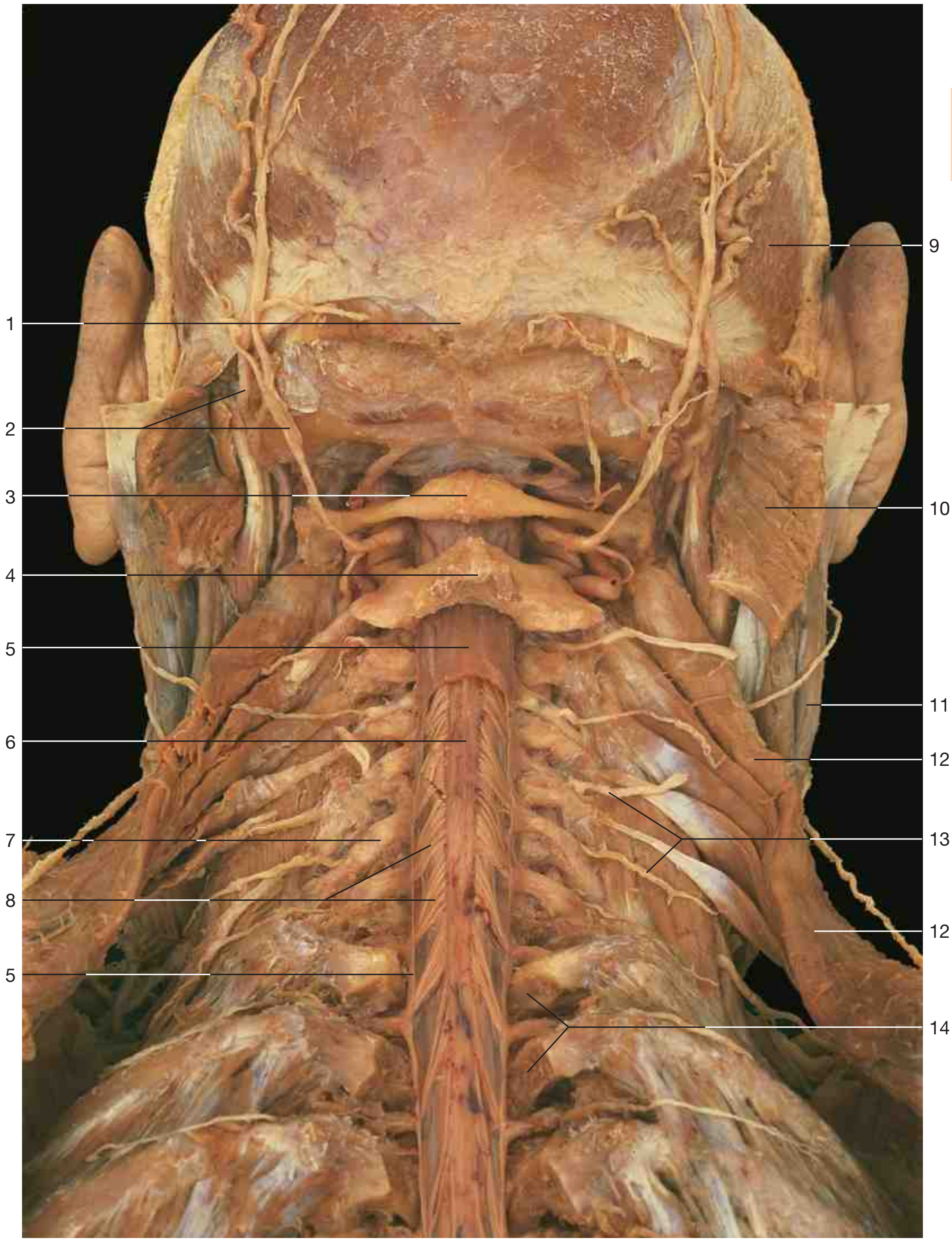


Suboccipital triangle and position of the vertebral artery (schematic drawing).



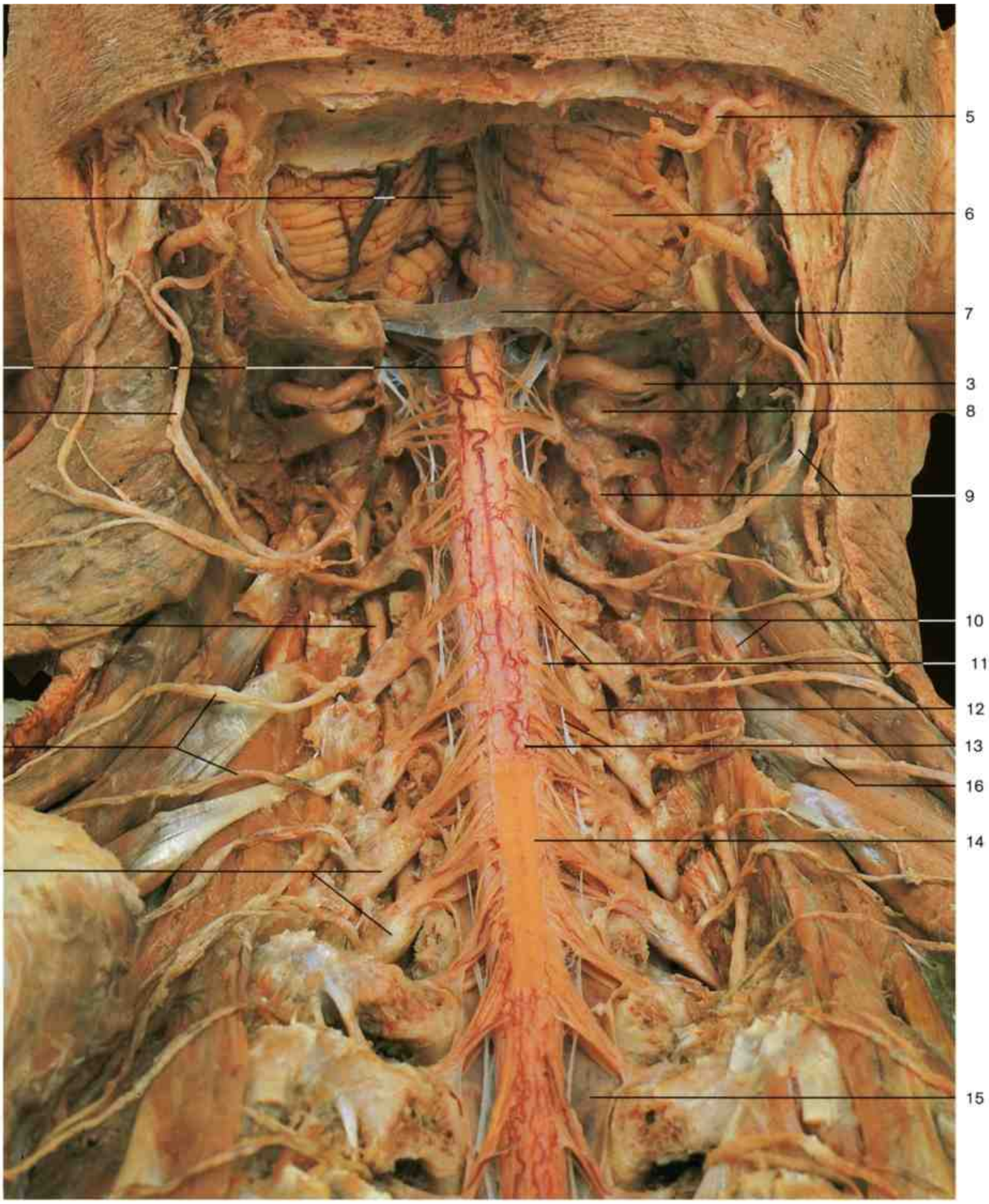
Dorsal aspect of the neck (deepest layer). Dissection of suboccipital triangle on both sides.

1 Occipital belly of occipitofrontalis muscle
2 Occipital artery
3 Insertion of semispinalis capitis muscle (divided)
4 Lesser occipital nerve (from cervical plexus)
5 Suboccipital nerve (C_1)
6 Greater occipital nerve (C_2)
7 Splenius capitis muscle (reflected)
8 Splenius cervicis muscle
9 Levator scapulae muscle
10 Accessory nerve (n. XI), trapezius muscle
11 Longissimus cervicis muscle
12 Iliocostalis cervicis muscle
13 Medial cutaneous branches of dorsal rami of spinal nerves (C_7, C_8)
14 Longissimus thoracis muscle
15 Medial margin of scapula
16 Rectus capitis posterior minor muscle
17 Obliquus capitis superior muscle
18 Rectus capitis posterior major muscle
19 Obliquus capitis inferior muscle
20 Spinous process of axis
21 Semispinalis cervicis muscle
22 Semispinalis capitis muscle (divided and reflected)
23 Transverse cervical artery (superficial branch)
24 Serratus posterior superior muscle (divided and reflected)
25 Rhomboid minor muscle (divided and reflected)
26 Rhomboid major muscle (divided and reflected)



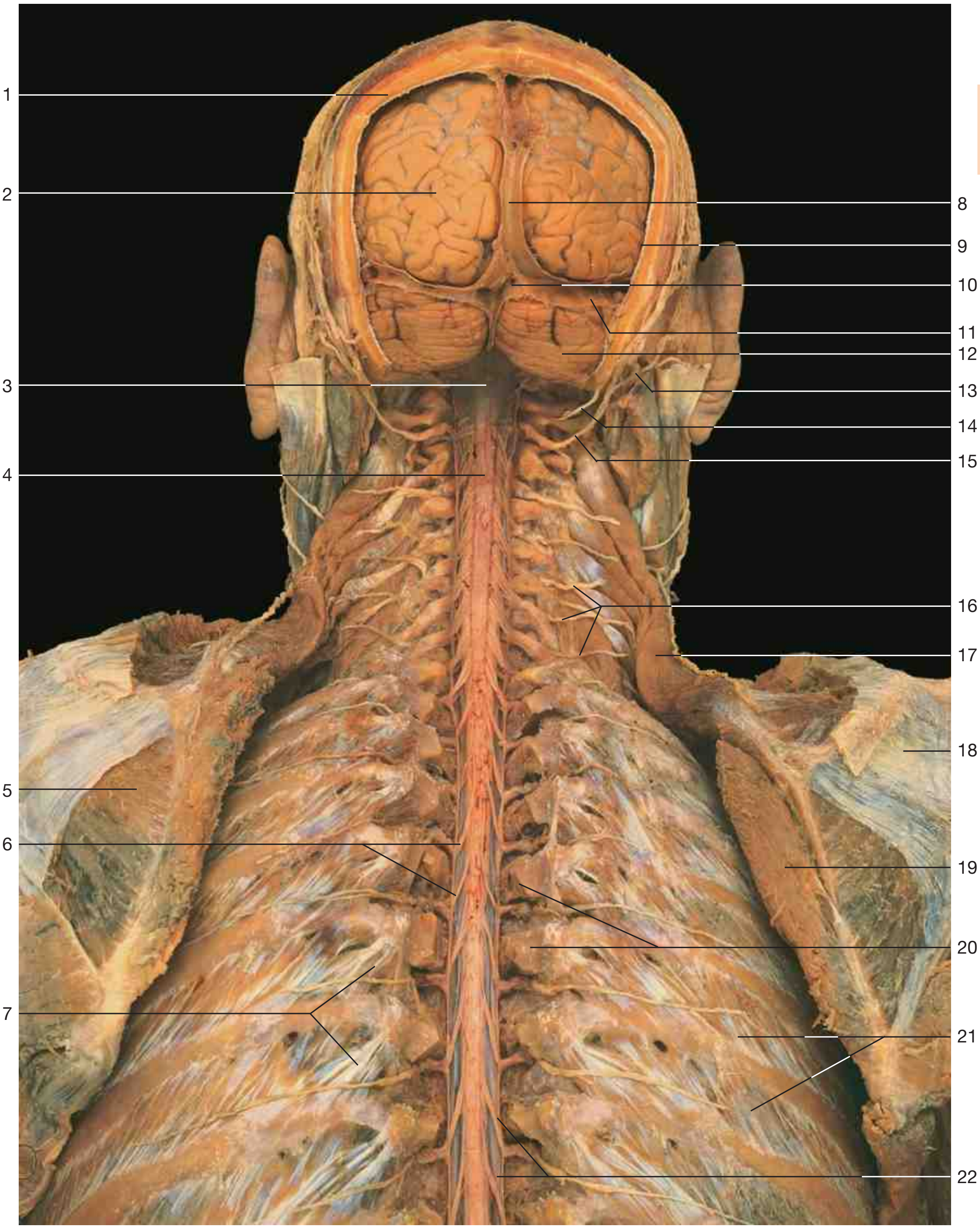
Dorsal aspect of the neck (deepest layer). The vertebral canal caudally of the atlas and axis has been opened to show the spinal cord (dura mater has been partly removed).

1	Protuberantia occipitalis externa	8	Posterior root filaments (fila radicularia posterior)
2	Greater occipital nerve (C_2) and occipital artery	9	Occipital belly of occipitofrontalis muscle
3	Atlas (posterior arch)	10	Splenius capitis muscle (cut and reflected)
4	Axis (posterior arch)	11	Sternocleidomastoid muscle
5	Dura mater	12	Levator scapulae muscle
6	Spinal cord	13	Posterior branches of spinal nerves
7	Spinal ganglion	14	Arches of cervical vertebrae (cut)



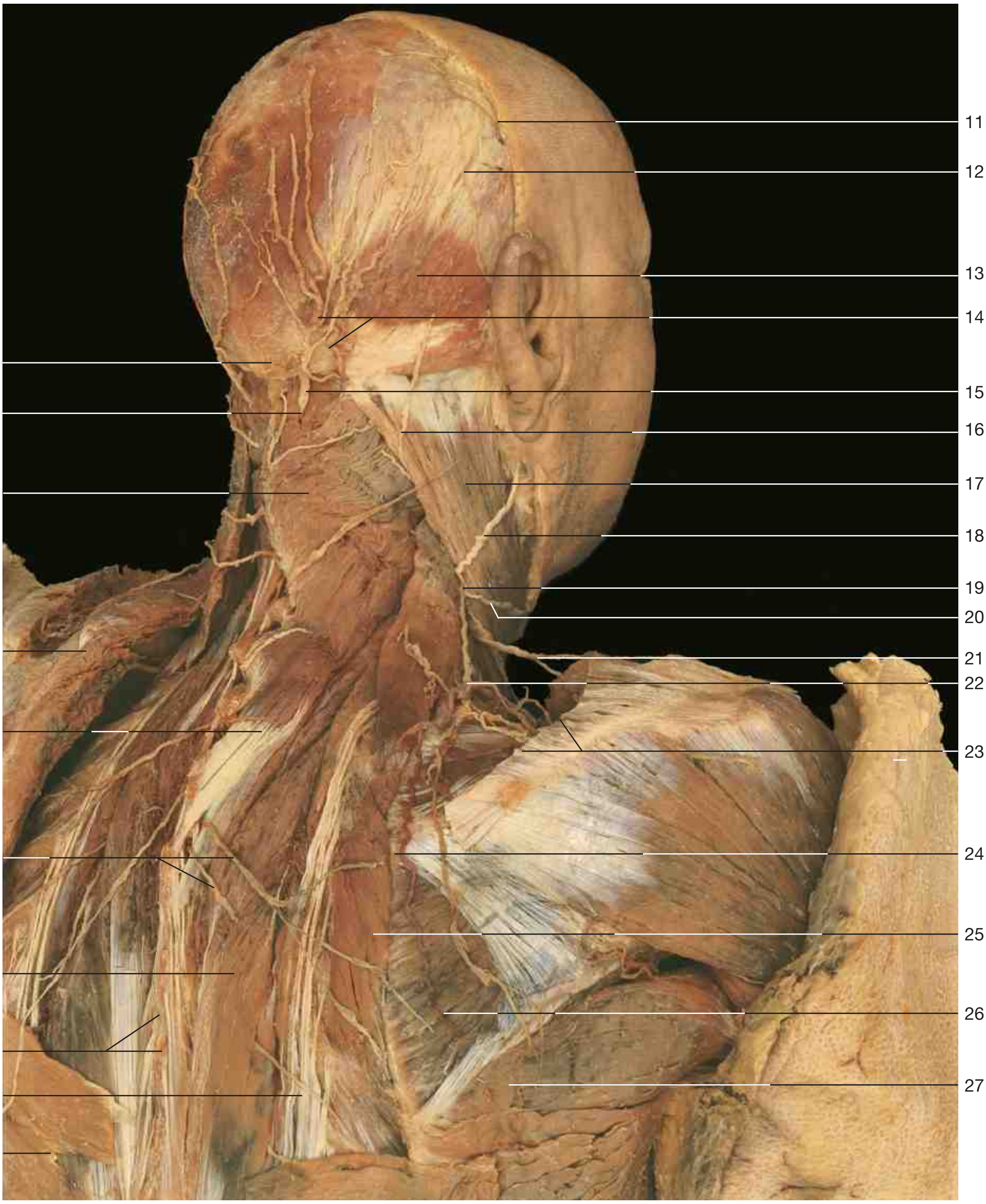
Dorsal aspect of the neck (deepest layer). Dissection of medulla oblongata and spinal cord. Cranial cavity opened.

1	Vermis of the cerebellum	9	Greater occipital nerve (C_2)
2	Medulla oblongata and posterior spinal artery	10	Levator scapulae muscle and intertransverse ligament
3	Vertebral artery	11	Dorsal roots of spinal nerves
4	Spinal ganglion	12	Vertebral arch
5	Occipital artery	13	Denticulate ligament and arachnoid mater
6	Cerebellum	14	Area where pia mater has been removed
7	Cerebellomedullary cistern	15	Dura mater
8	Atlas	16	Dorsal rami of spinal nerves



Dorsal aspect of the neck (deepest layer). Dissection of medulla oblongata and spinal cord in relation to the brain.

1	Calvaria	12	Cerebellum
2	Left hemisphere of the brain	13	Occipital artery
3	Cerebellomedullary cistern	14	Suboccipital nerve (C_1)
4	Spinal cord	15	Greater occipital nerve (C_2)
5	Scapula with infraspinous muscle	16	Posterior branches of spinal nerves
6	Root filaments (fila radicularia posterior)	17	Levator scapulae muscle
7	Levatores costarum muscles	18	Deltoid muscle
8	Falx cerebri with sinus sagittalis superior	19	Rhomboid muscles
9	Subarachnoidal space	20	Vertebral arches (cut)
10	Confluens sinuum	21	External intercostal muscle
11	Transverse sinus	22	Dura mater

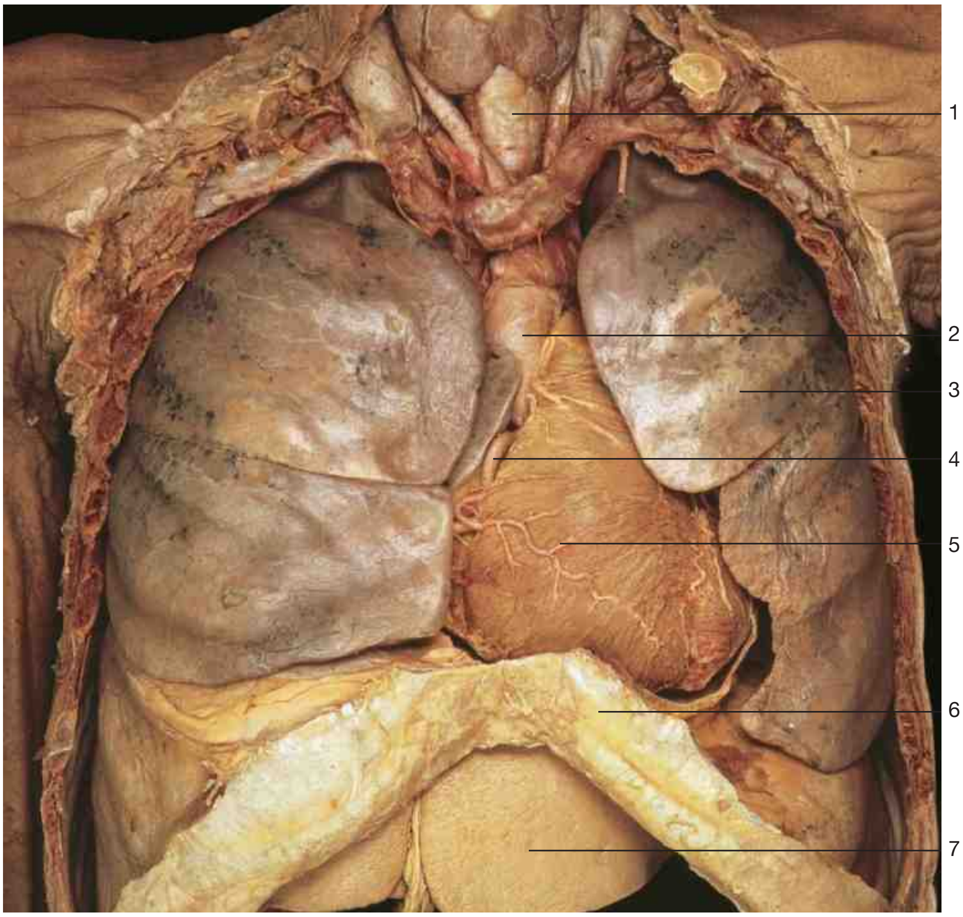


Oblique-lateral aspect of the neck and head (deeper layer). The trapezius muscle has been removed.

1	Protuberantia occipitalis externa
2	Semispinalis capitis muscle
3	Splenius capitis muscle
4	Scapula
5	Splenius cervicis muscle
6	Posterior branches of spinal nerves
7	Longissimus muscle
8	Spinous processes of thoracic vertebrae
9	Iliocostalis muscle
10	Latissimus dorsi muscle
11	Epidermis of the head (scalp)
12	Galea aponeurotica
13	Occipital belly of occipitofrontalis muscle
14	Occipital artery
15	Greater occipital nerve (C_2)
16	Lesser occipital nerve
17	Sternocleidomastoid muscle
18	Great auricular nerve
19	Punctum nervosum
20	Transverse cervical nerve
21	Supraclavicular nerves
22	Accessory nerve (n. XI)
23	Trapezius muscle (cut edge)
24	Medial margin of scapula
25	Rhomboid muscle
26	Infraspinous muscle
27	Teres major muscle

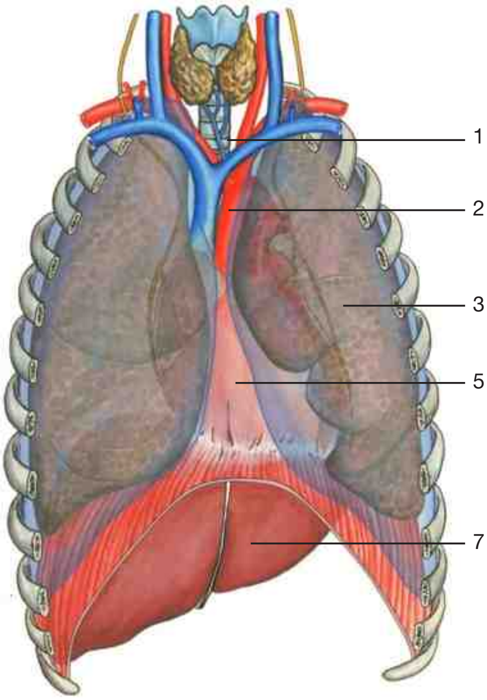
4 Thoracic Organs

The thoracic cavity contains heart, lungs, and mediastinal organs. The thorax protects all organs but is still movable so that respiration can occur. The respiratory movements of the lung depend on the pleura covering, the thoracic wall, and the surface of the lungs.
The mediastinal organs comprise the esophagus, trachea, and the related nerves and vessels, particularly the aorta, superior vena cava, and the thoracic duct. The thoracic cavity is separated from the abdominal cavity by the diaphragm.

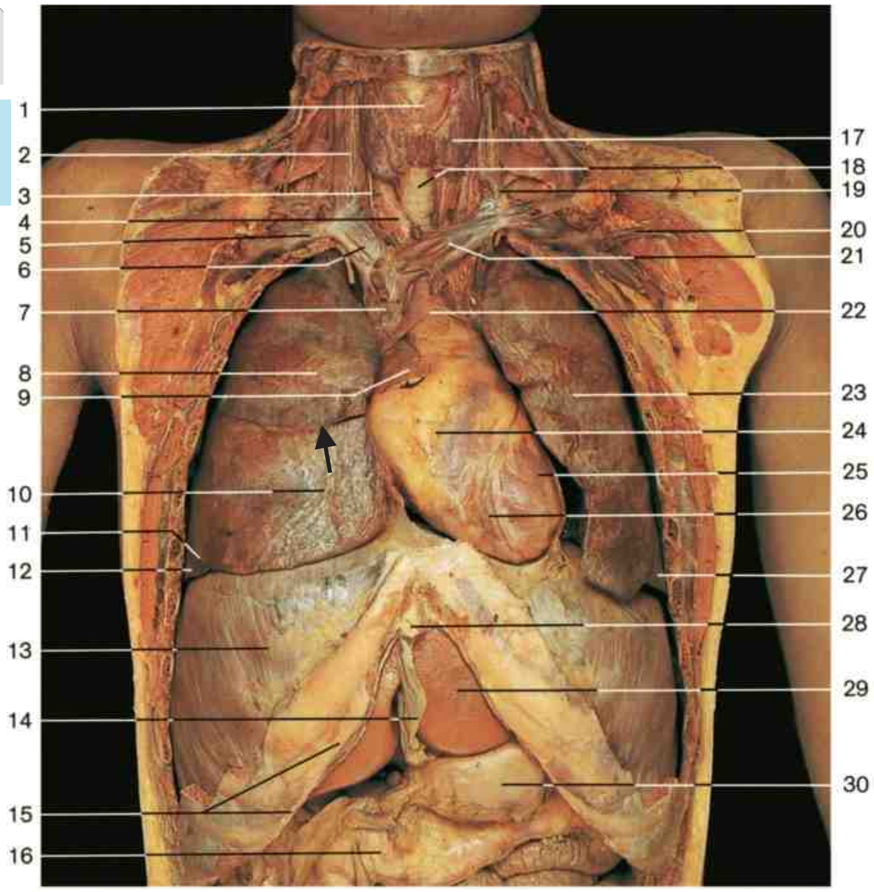


Thoracic organs, heart, and lungs in situ (ventral aspect). Anterior thoracic wall, parietal pleura, and pericardium have been removed.

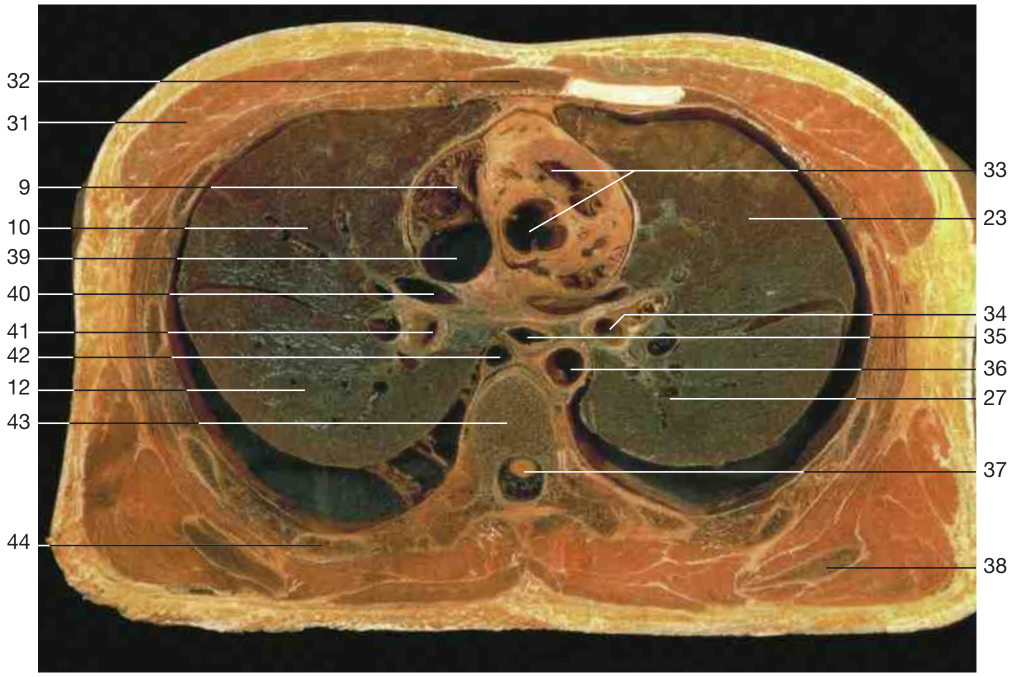
1 Trachea
2 Ascending aorta
3 Left lung
4 Right coronary artery
5 Heart (right ventricle)
6 Costal arch
7 Liver



Position of lungs and heart within the thoracic cavity (schematic drawing). The anterior part of the thorax is not depicted.

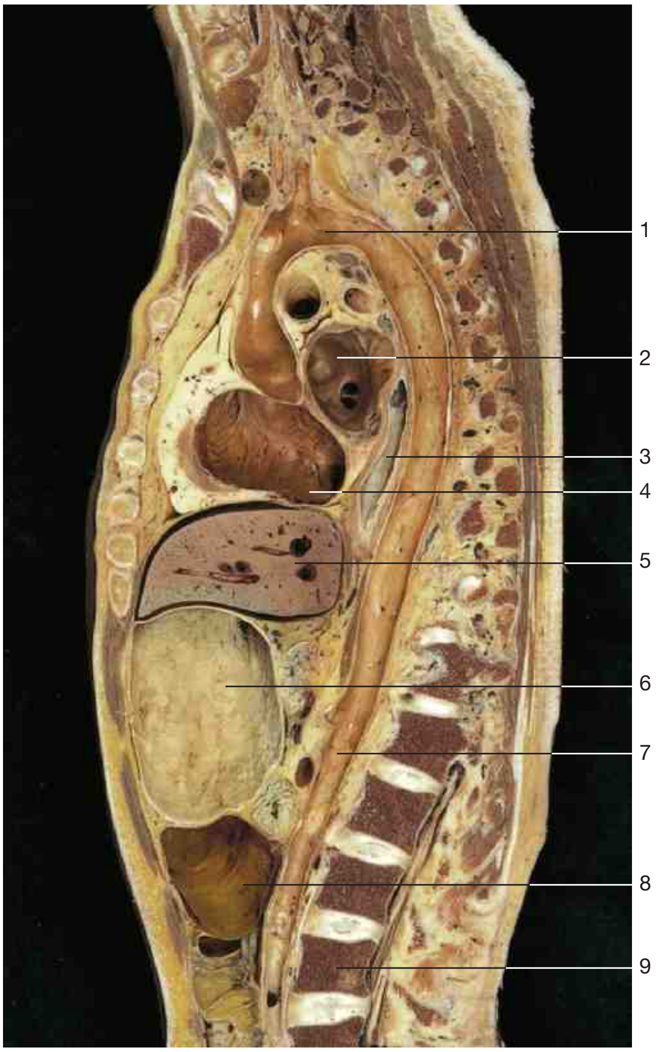


Positions of thoracic organs. The anterior thoracic wall has been removed. Arrow: horizontal fissure of right lung.

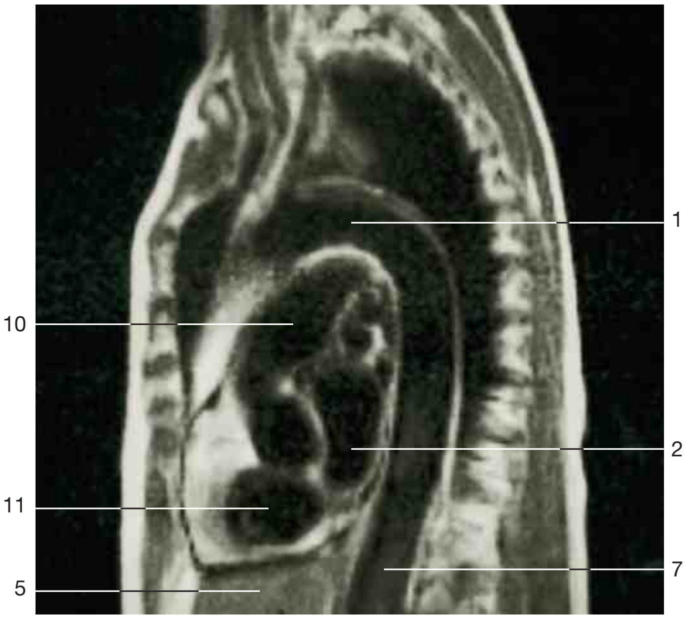


Horizontal section through the thorax at the level of the seventh thoracic vertebra (from below).

1 Cricothyroid muscle
2 Right internal jugular vein
3 Vagus nerve
4 Right common carotid artery
5 Right subclavian vein
6 Right brachiocephalic vein
7 Superior vena cava
8 Upper lobe of right lung
9 Right auricle
10 Middle lobe of right lung
11 Oblique fissure of right lung
12 Lower lobe of right lung
13 Diaphragm
14 Falciform ligament
15 Costal margin
16 Transverse colon
17 Thyroid gland
18 Trachea
19 Left internal jugular vein
20 Left cephalic vein
21 Left brachiocephalic vein
22 Pericardium (cut edge)
23 Upper lobe of left lung
24 Right ventricle
25 Left ventricle
26 Anterior interventricular sulcus
27 Lower lobe of left lung
28 Xiphoid process
29 Liver
30 Stomach
31 Pectoralis major muscle
32 Sternum
33 Left ventricle and bulb of aorta
34 Left main bronchus
35 Esophagus
36 Descending aorta
37 Spinal cord
38 Scapula
39 Right atrium
40 Right pulmonary vein
41 Right main bronchus
42 Azygos vein
43 Body of vertebra
44 Rib

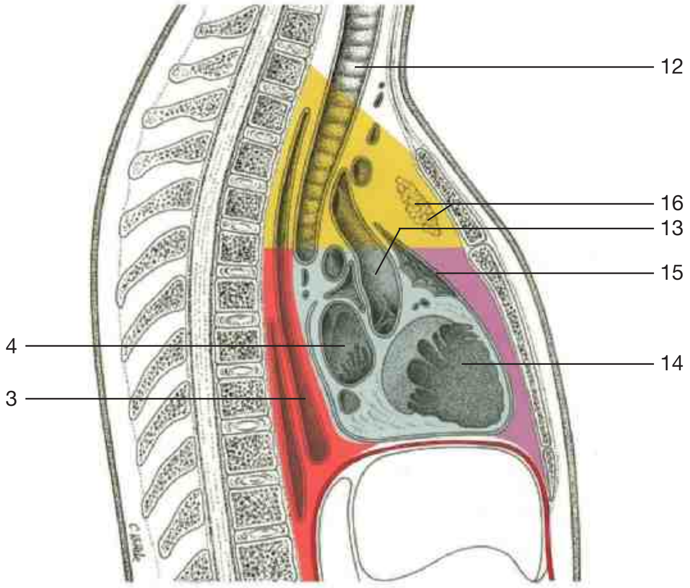


Sagittal section through the thorax, 2 cm lateral to the median plane.



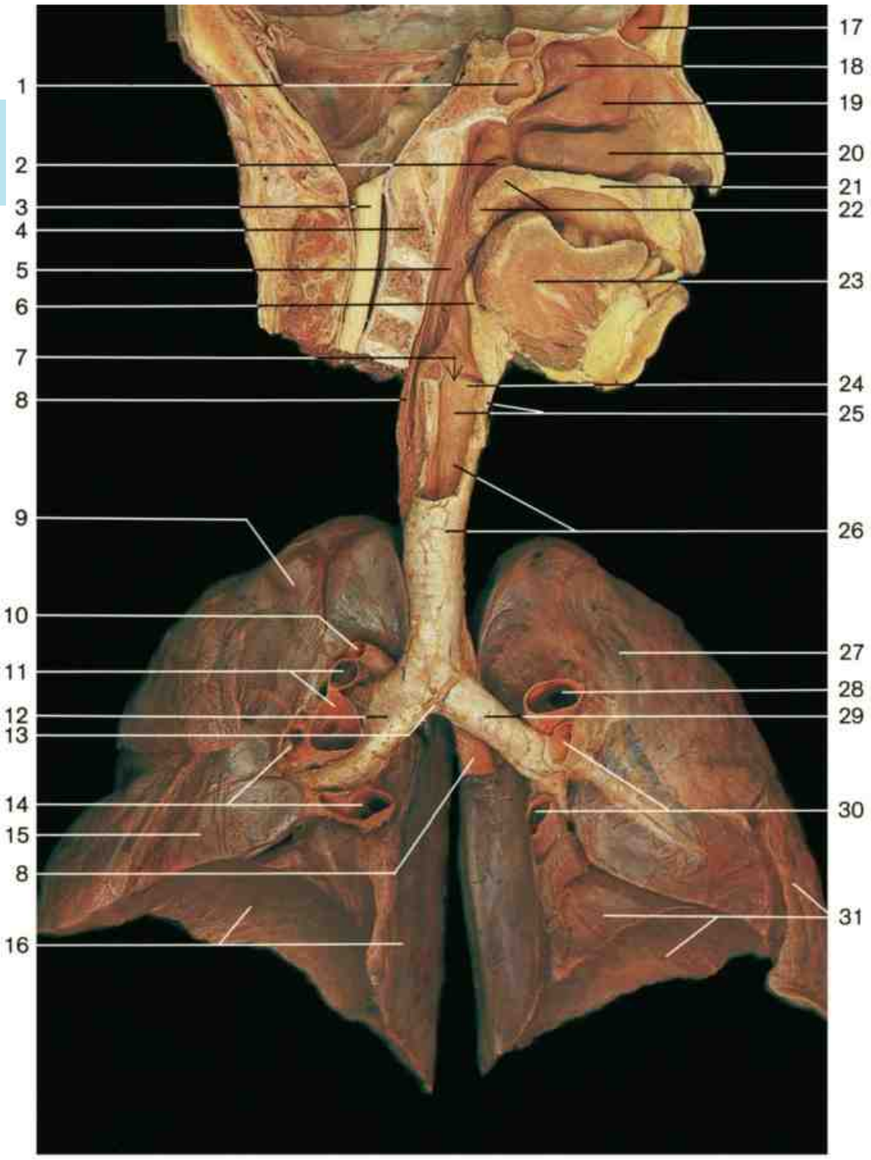
Sagittal section through the thorax (MRI scan).

1 Aortic arch
2 Left atrium of the heart
3 Esophagus
4 Right atrium of the heart
5 Liver
6 Stomach
7 Abdominal aorta
8 Transverse colon (dilated)
9 Lumbar vertebral body
10 Pulmonary trunk
11 Left ventricle of the heart
12 Trachea
13 Ascending aorta
14 Right ventricle of the heart
15 Pericardium
16 Remaining parts of thymus gland

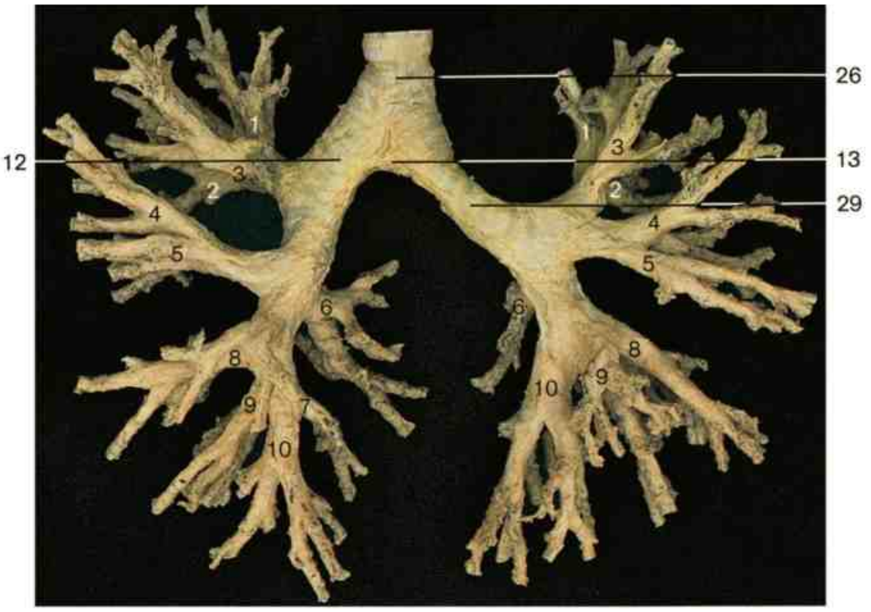


Regional anatomy of the thoracic cavity (midsagittal section). The parts of the mediastinum are indicated by colors.

Parts of mediastinum	Content
Superior mediastinum (yellow)	Trachea, brachiocephalic vein, thymus, aortic arch, esophagus, thoracic duct
Middle portion of mediastinum (light blue)	Heart, ascending aorta, pulmonary trunk, pulmonary veins, phrenic nerves
Posterior mediastinum (red)	Esophagus with vagus nerves, descending aorta, thoracic duct, sympathetic trunks
Anterior portion of mediastinum (light red)	Smaller vessels and nerves, fat and connective tissue, thymus (only in the child)



Respiratory system. The lungs have been fixed in expiration and turned laterally. Head bisected and turned laterally.

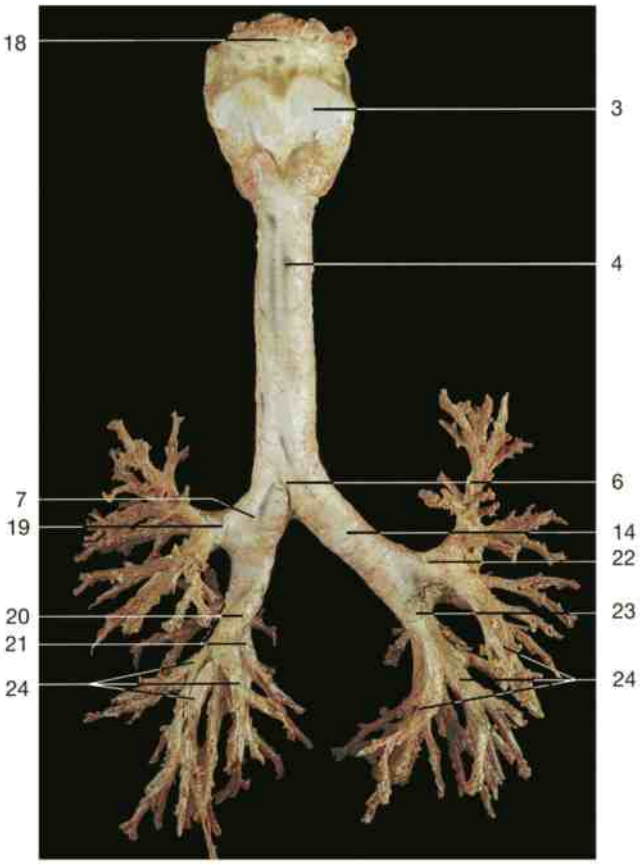


Bronchial tree (ventral aspect). The lung tissue has been removed. The bronchopulmonary segments are numbered 1–10.

1 Sphenoid sinus
2 Pharyngeal opening of auditory tube
3 Spinal cord
4 Dens of axis
5 Oropharynx (oropharyngeal isthmus)
6 Epiglottis
7 Entrance of larynx
8 Esophagus
9 Upper lobe of right lung
10 Azygos vein
11 Branches of pulmonary artery
12 Right main bronchus
13 Bifurcation of trachea
14 Tributaries of right pulmonary veins
15 Middle lobe of right lung
16 Lower lobe of right lung
17 Frontal sinus
18 Superior nasal concha
19 Middle nasal concha
20 Inferior nasal concha
21 Hard palate
22 Soft palate with uvula
23 Tongue
24 Vocal fold
25 Larynx
26 Trachea
27 Upper lobe of left lung
28 Left pulmonary artery
29 Left main bronchus
30 Left pulmonary veins
31 Lower lobe of left lung

▷ **To page 247:**

1 Nasal cavity
2 Pharynx
3 Larynx (thyroid cartilage)
4 Trachea
5 Upper lobe of right lung
6 Bifurcation of trachea
7 Right main bronchus
8 Horizontal fissure of right lung
9 Middle lobe of right lung
10 Oblique fissures of lungs
11 Lower lobe of right lung
12 Clavicle
13 Upper lobe of left lung
14 Left main bronchus
15 Bronchi supplying bronchopulmonary segments
16 Lower lobe of left lung
17 Costal margin
18 Hyoid bone
19 Right superior lobe bronchus
20 Right middle lobe bronchus
21 Right inferior lobe bronchus
22 Left superior lobe bronchus
23 Left inferior lobe bronchus
24 Segmental bronchi
25 Branches of pulmonary arteries
26 Branches of pulmonary veins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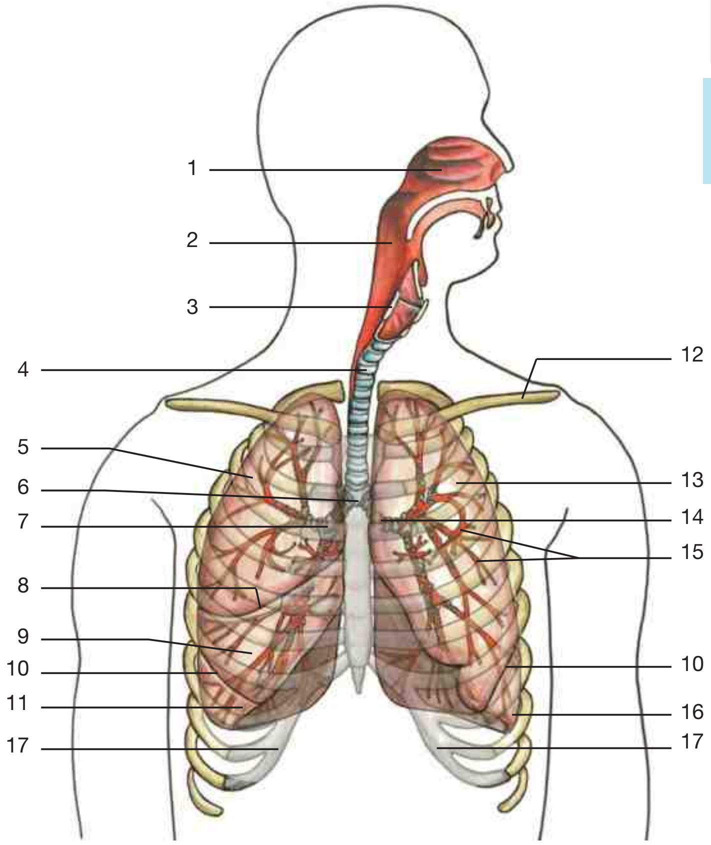
Larynx, trachea, and bronchial tree (anterior aspect).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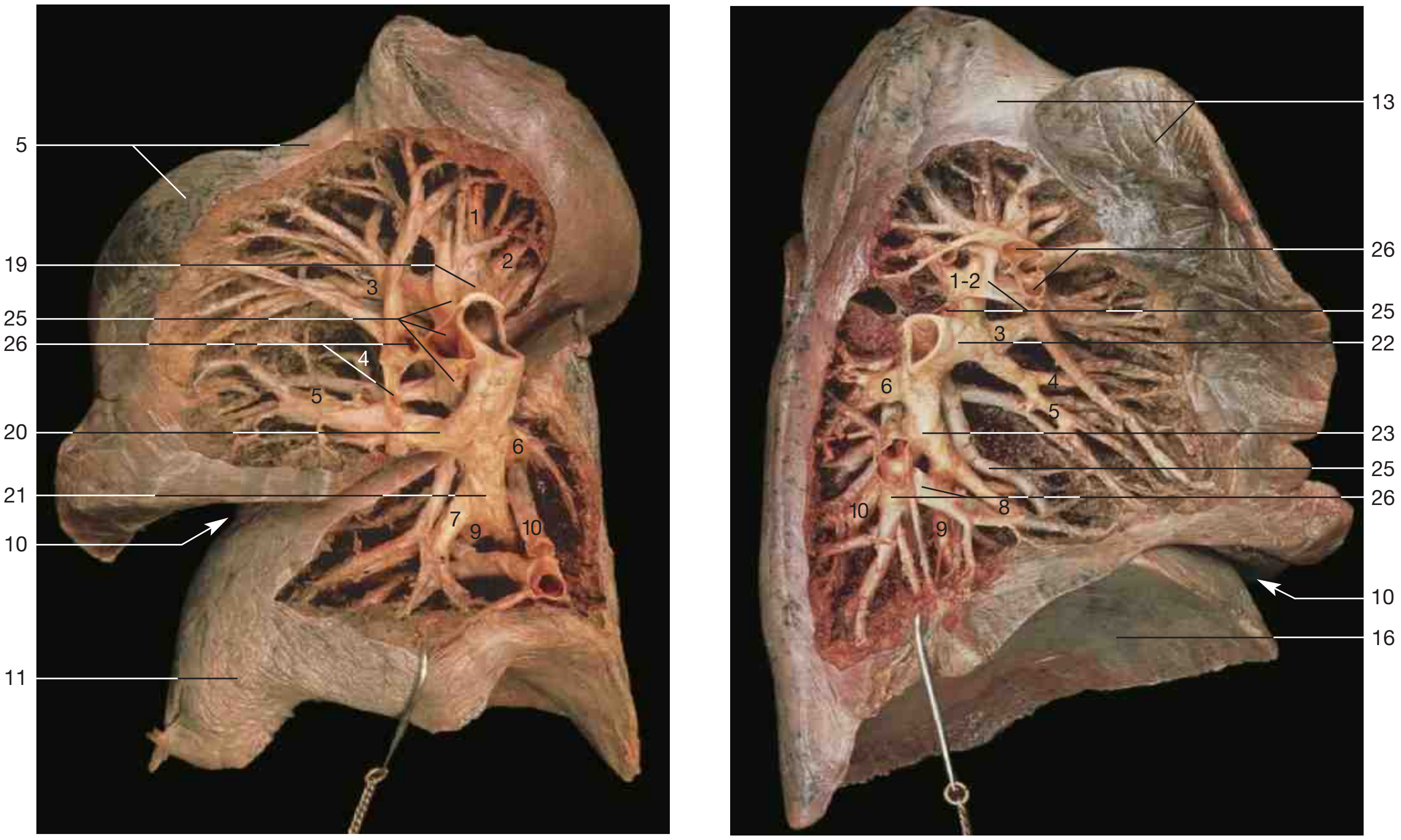
Organization and positions of respiratory organs (schematic drawing).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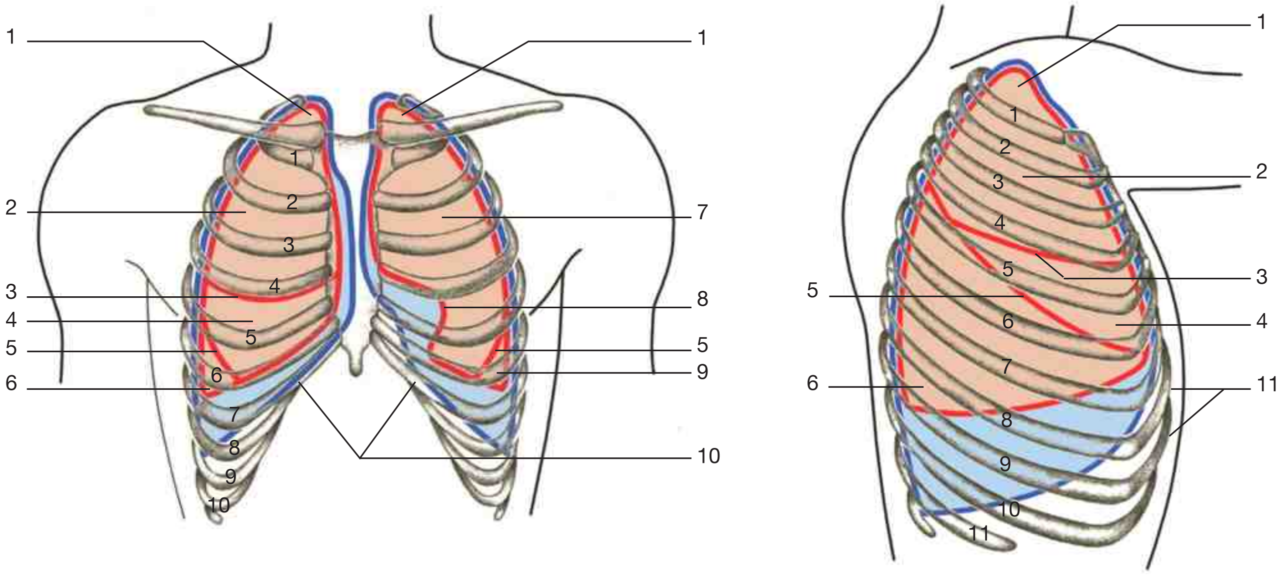
Mediastinal dissection of the bronchial tree, pulmonary veins, and pulmonary arteries of right lung (left) and left lung (right) (medial aspect). The bronchopulmonary segments are numbered 1–10.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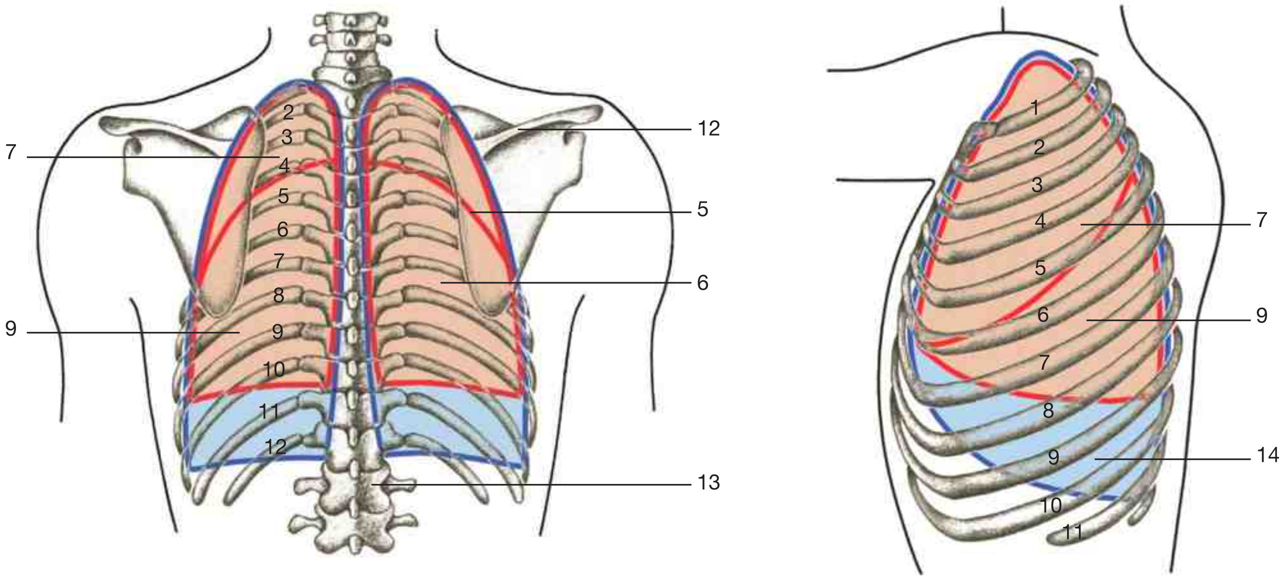
Surface projections of lungs and pleura on the thoracic wall. Left: anterior aspect; right: right-lateral aspect. Red = margins of the lung; blue = margins of pleura. The numbers indicate ribs.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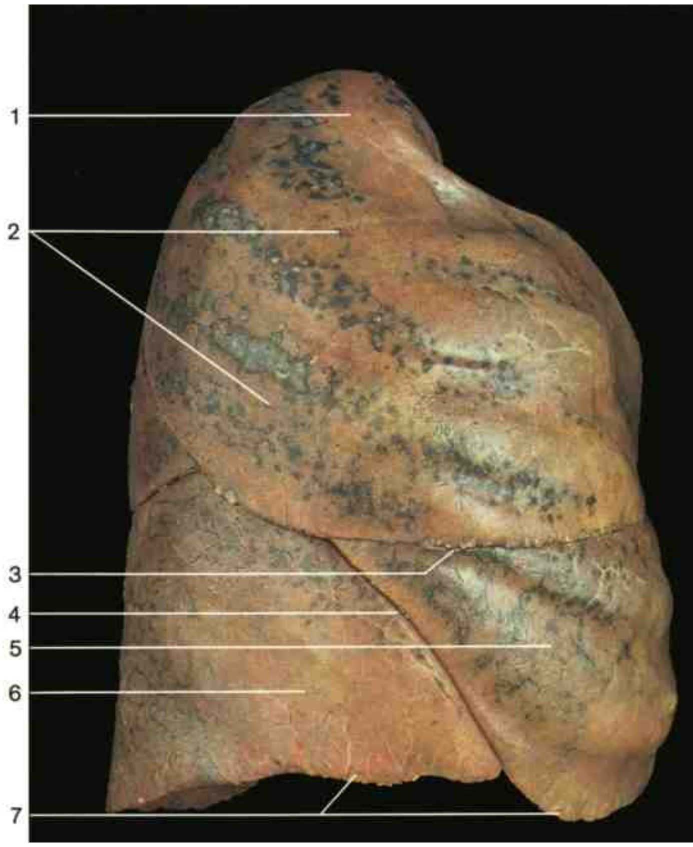
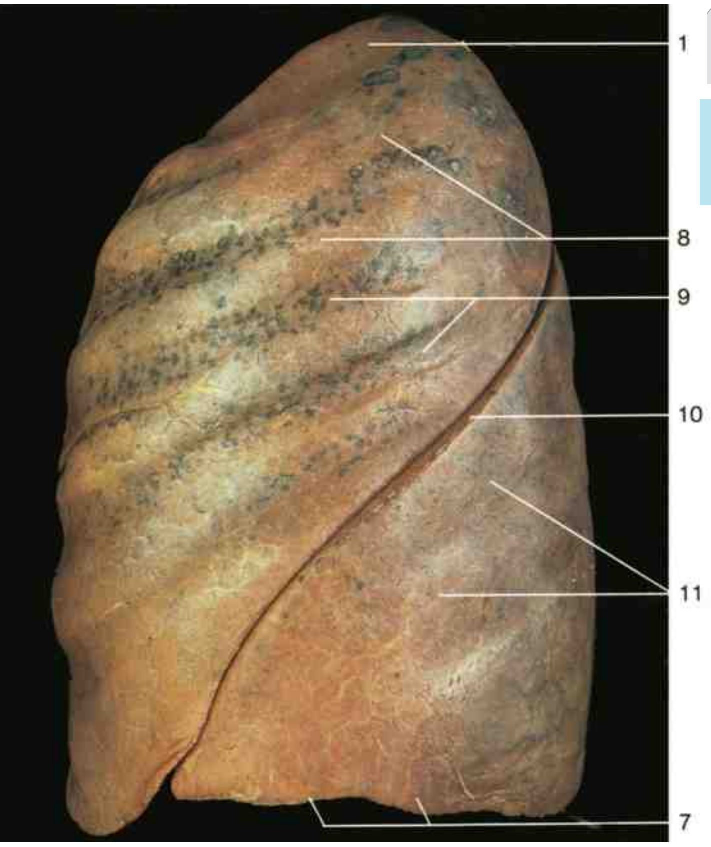
Surface projections of lungs and pleura on the thoracic wall. Left: posterior aspect; right: left-lateral aspect. Red = margins of lung; blue = margins of pleura. The numbers indicate ribs.

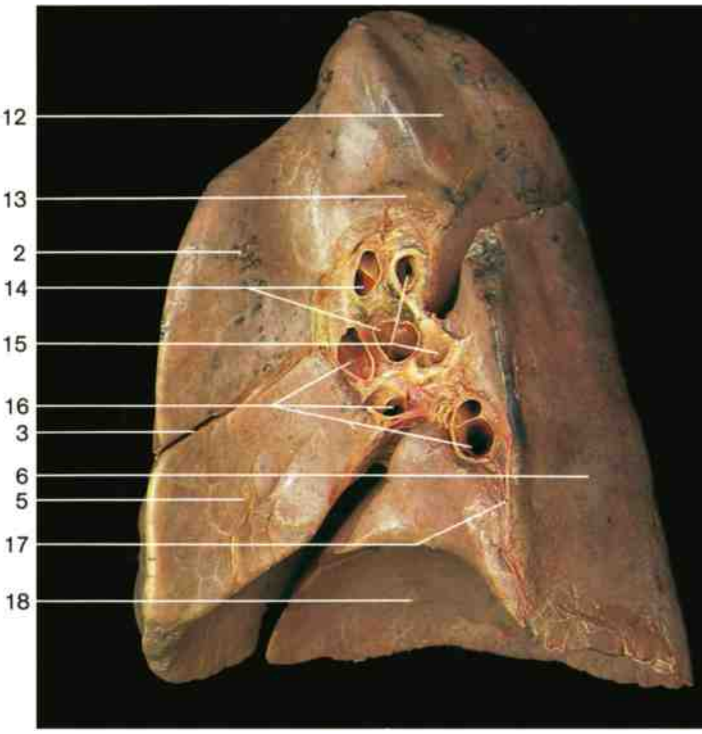
1	Apex of lung
2	Upper lobe of right lung
3	Horizontal fissure of right lung
4	Middle lobe of right lung
5	Oblique fissures of lungs
6	Lower lobe of right lung
7	Upper lobe of left lung
8	Cardiac notch of left lung
9	Lower lobe of left lung
10	Infrasternal angle
11	Costal margin
12	Spine of scapula
13	First lumbar vertebra
14	Space between border of lung and pleura (costodiaphragmatic recess)



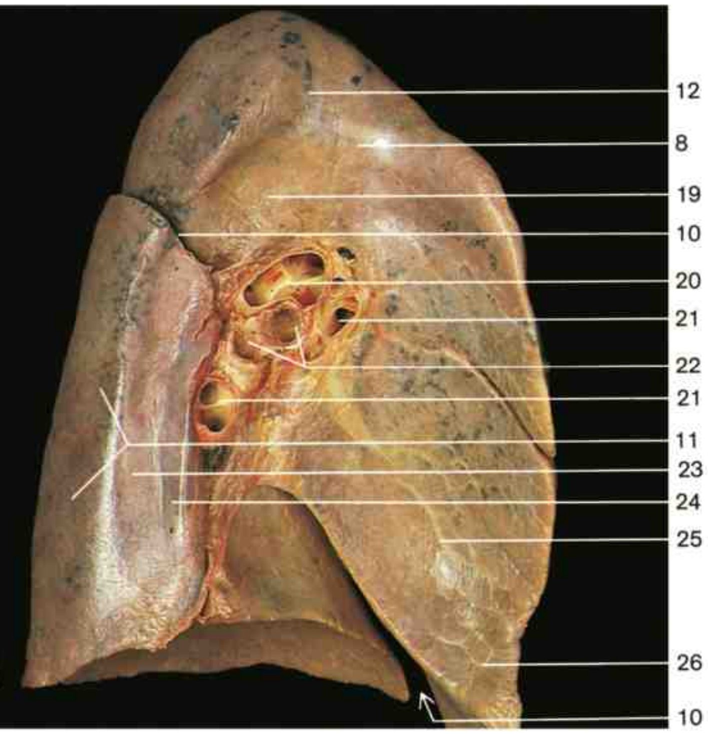
Right lung (lateral aspect).



Left lung (lateral aspect).

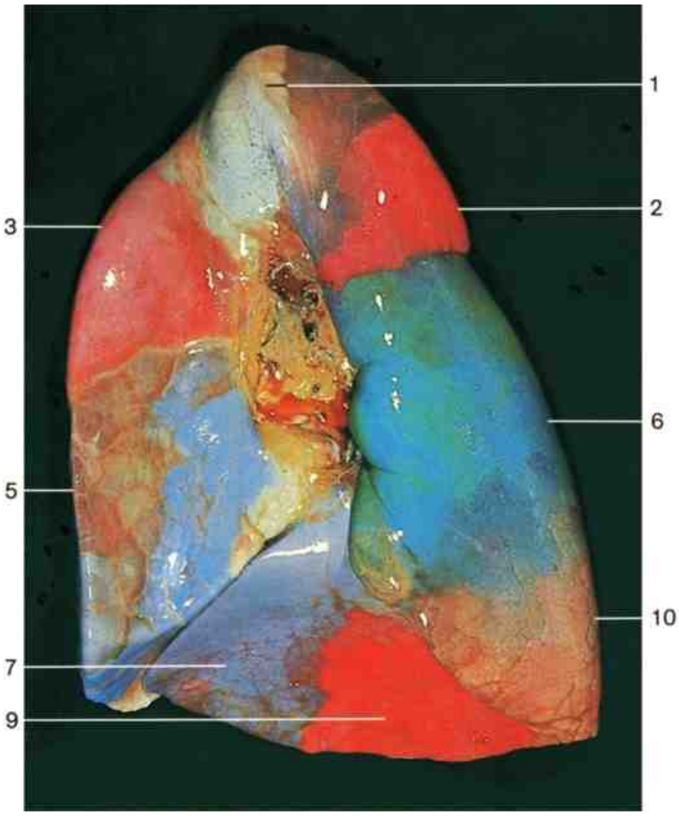


Right lung (medial aspect).

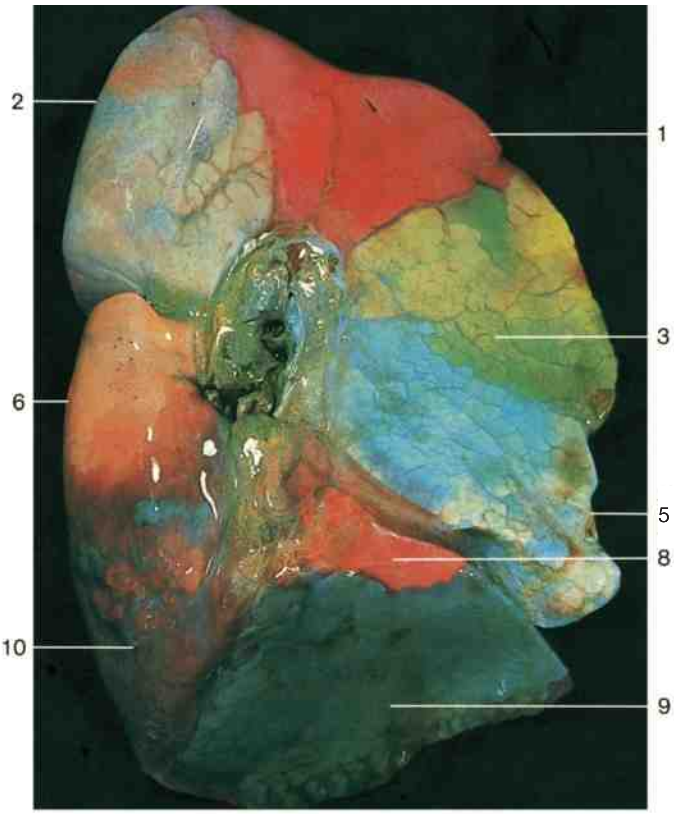


Left lung (medial aspect).

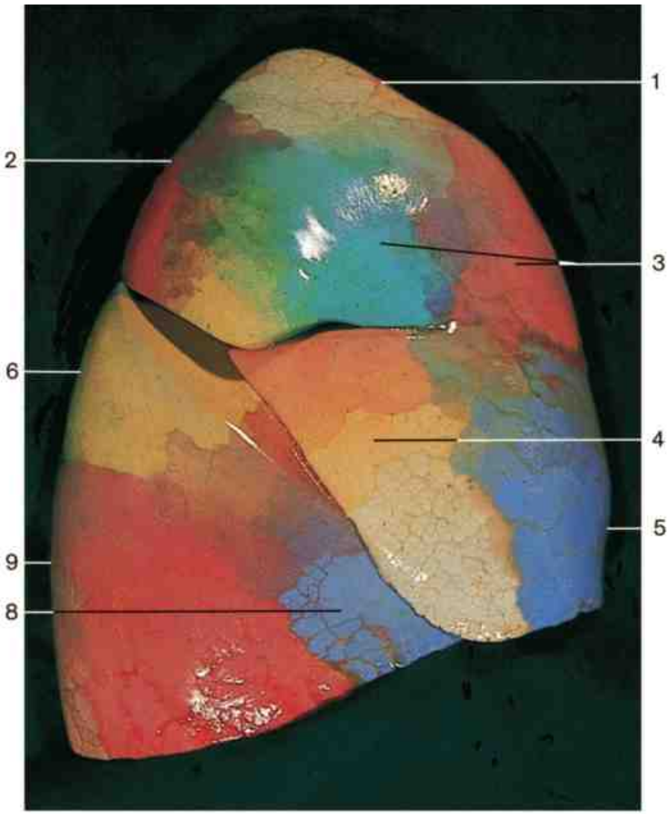
1 Apex of lung
2 Upper lobe of right lung
3 Horizontal fissure of right lung
4 Oblique fissure of right lung
5 Middle lobe of right lung
6 Lower lobe of right lung
7 Inferior border
8 Upper lobe of left lung
9 Impressions of ribs
10 Oblique fissure of left lung
11 Lower lobe of left lung
12 Groove of subclavian artery
13 Groove of azygos arch
14 Branches of right pulmonary artery
15 Bronchi
16 Right pulmonary veins
17 Pulmonary ligament
18 Diaphragmatic surface
19 Groove of aortic arch
20 Left pulmonary artery
21 Branches of left pulmonary veins
22 Left secondary bronchi
23 Groove of thoracic aorta
24 Groove of esophagus
25 Cardiac impression
26 Lingula



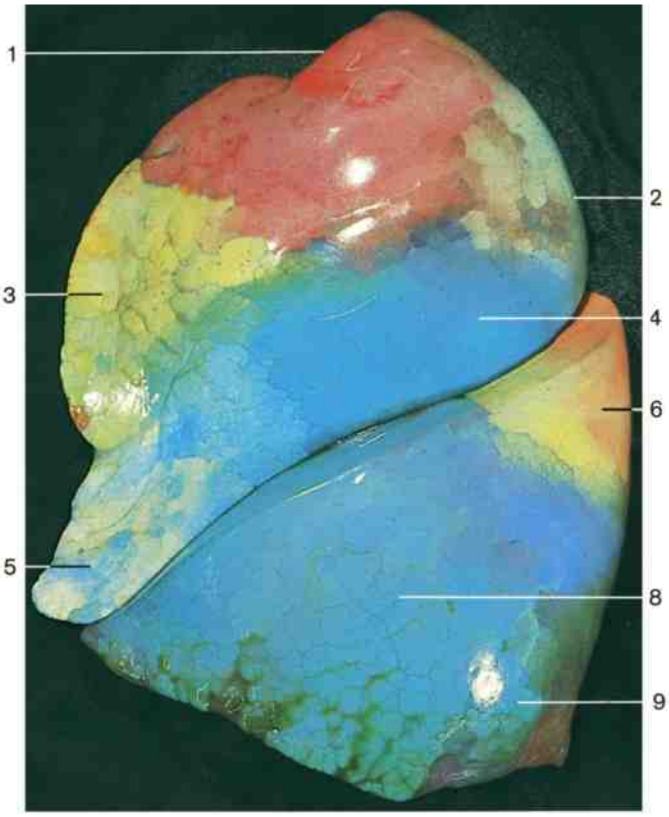
Right lung (medial aspect).



Left lung (medial aspect).

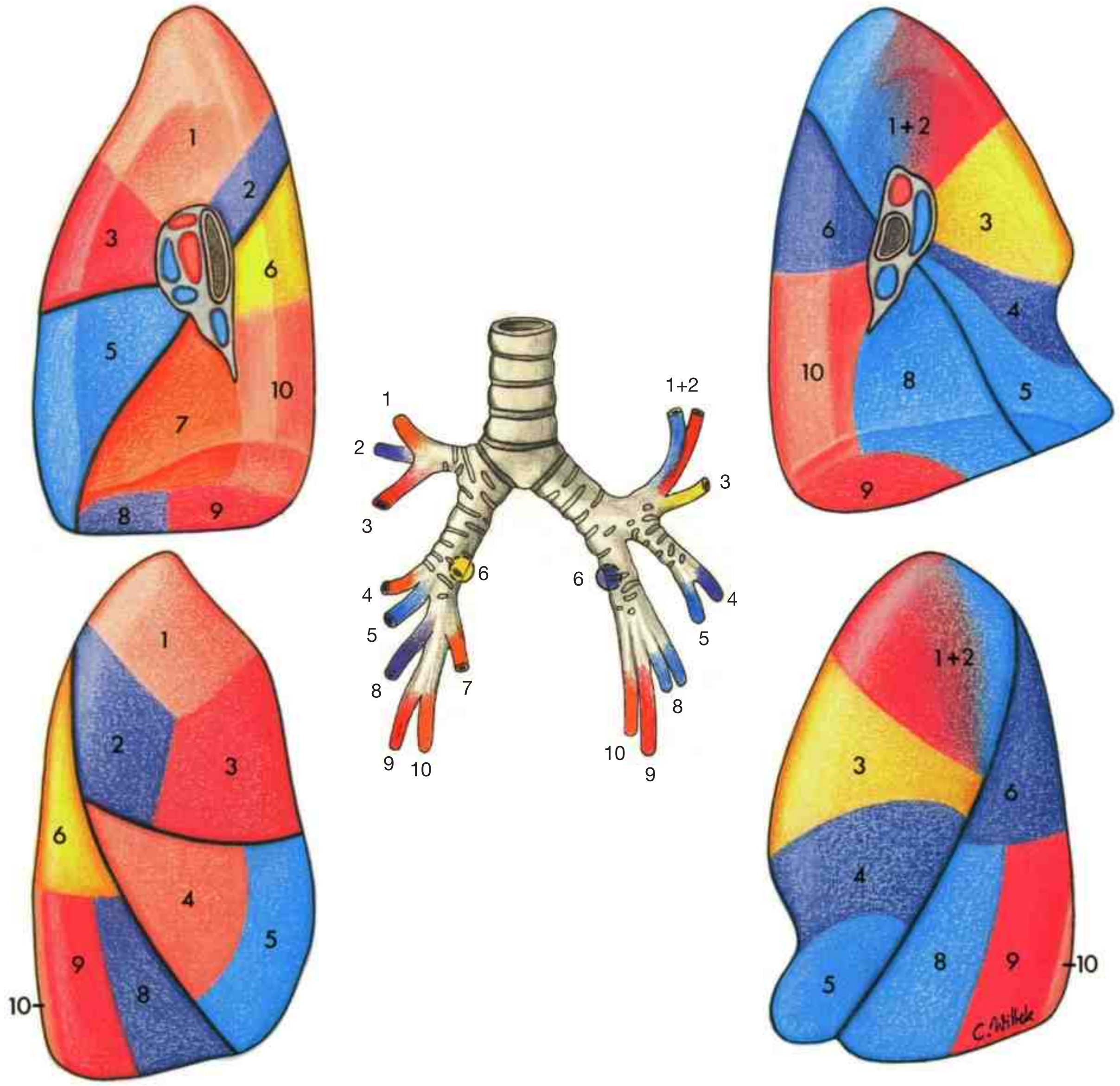


Right lung (lateral aspect).



Left lung (lateral aspect).

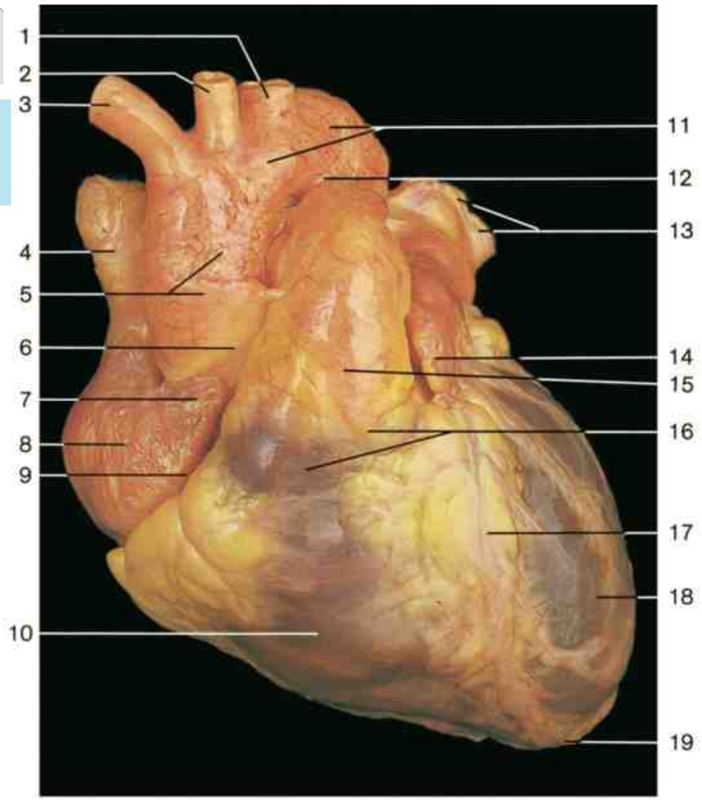
The bronchopulmonary segments of the lungs are differentiated by the various colors. Notice that there is no segment in the left lung that corresponds to the seventh segment of the right lung. Compare with the schematic drawing on the facing page.



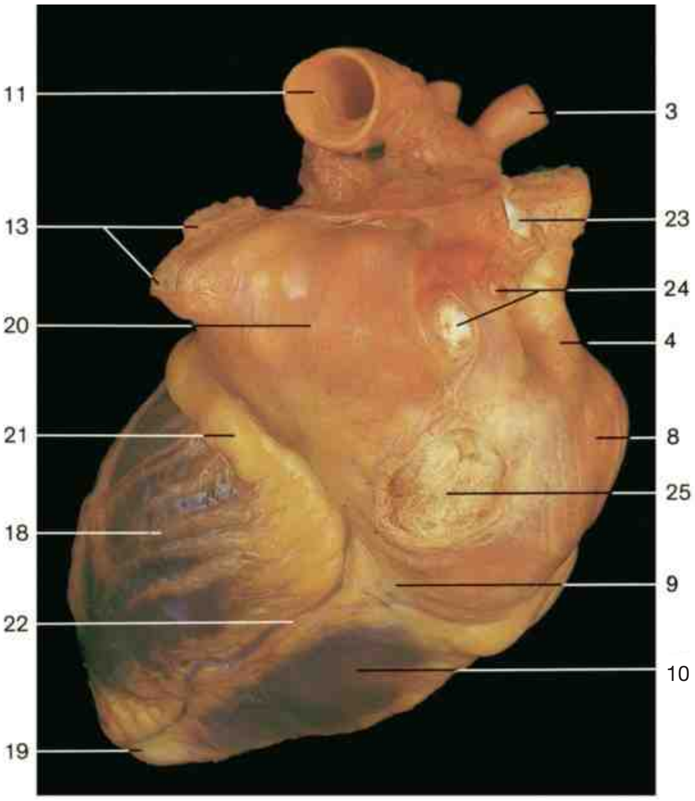
Distribution of bronchopulmonary segments of the lungs and their relation to the bronchial tree (after J. F. Huber).

The bronchopulmonary segments are morphologically and functionally separate, independent respiratory units of the lung tissue. Each segment is surrounded by connective tissue that is continuous with the visceral pleura. The segmental bronchi are centrally located in each segment and are closely accompanied by branches of the pulmonary arteries, whereas the tributaries of the pulmonary veins run **between** the segments. Thus, the veins serve two adjacent segments that drain for the most part into more than one vein. A bronchopulmonary segment is therefore not a complete vascular unit, but segmentation is the result of a specific architecture of the lung vasculature.

Right lung			**Left lung**			
1	Apical segment	Upper lobe bronchus	1+2	Apicoposterior segment	Superior division	Upper lobe bronchus
2	Posterior segment		3	Anterior segment		
3	Anterior segment					
4	Lateral segment	Middle lobe bronchus	4	Superior lingular segment	Inferior division	
5	Medial segment		5	Inferior lingular segment		
6	Superior (apical) segment	Lower lobe bronchus	6	Superior (apical) segment		Lower lobe bronchus
7	Medial basal segment		7	Absent		
8	Anterior basal segment		8	Anteromedial basal segment		
9	Lateral basal segment		9	Lateral basal segment		
10	Posterior basal segment		10	Posterior basal segment		

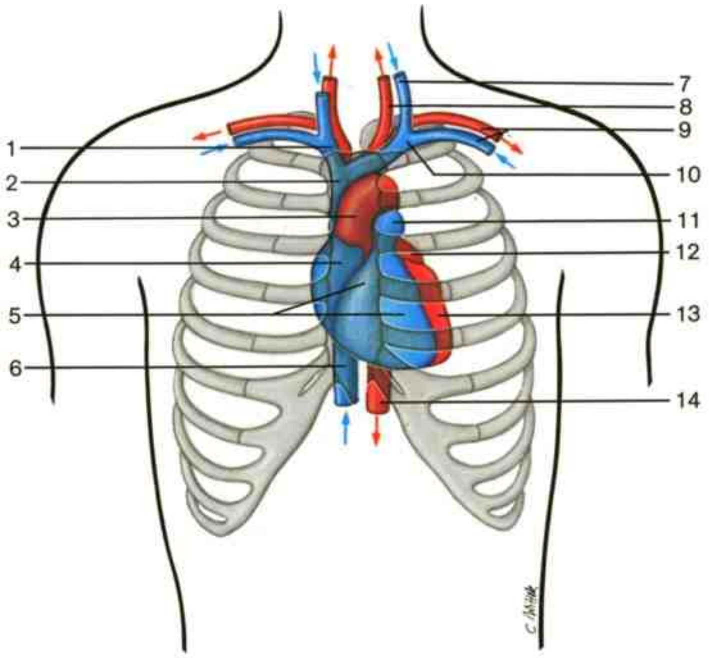


Heart of 30-year-old woman (anterior aspect).



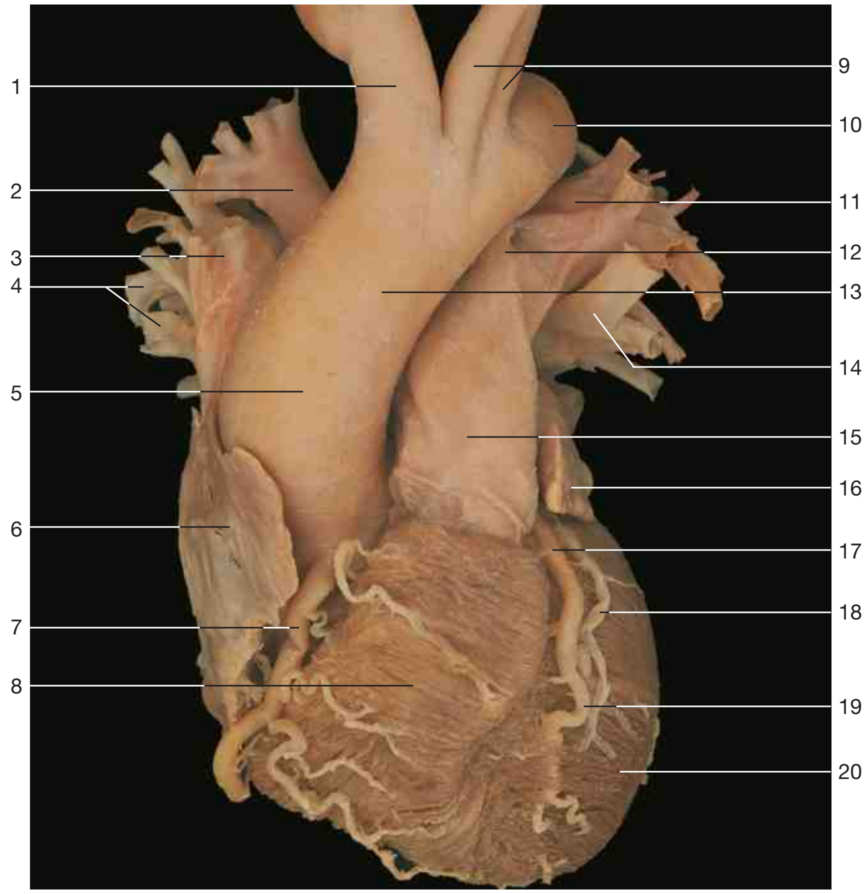
Heart of 30-year-old woman (oblique-posterior view).

1 Left subclavian artery
2 Left common carotid artery
3 Brachiocephalic trunk
4 Superior vena cava
5 Ascending aorta
6 Bulb of the aorta
7 Right auricle
8 Right atrium
9 Coronary sulcus
10 Right ventricle
11 Aortic arch
12 Ligamentum arteriosum
13 Left pulmonary veins
14 Left auricle
15 Pulmonary trunk
16 Sinus of pulmonary trunk
17 Anterior interventricular sulcus
18 Left ventricle
19 Apex of the heart
20 Left atrium
21 Epicardial fat overlying coronary sinus
22 Posterior interventricular sulcus
23 Right pulmonary artery
24 Right pulmonary veins
25 Inferior vena cava



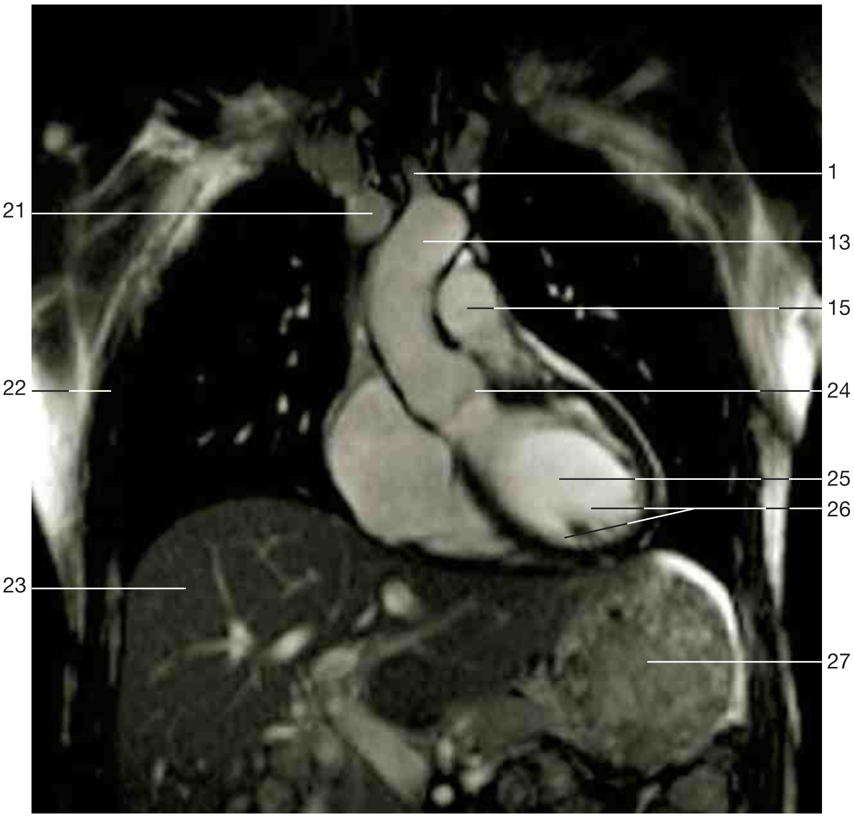
Position of heart and its vessels within the thorax (schematic drawing).

1 Right brachiocephalic vein
2 Superior vena cava
3 Ascending aorta
4 Right atrium
5 Right ventricle
6 Inferior vena cava
7 Left internal jugular vein
8 Left common carotid artery
9 Left axillary artery and vein
10 Left brachiocephalic vein
11 Pulmonary trunk
12 Left auricle
13 Left ventricle
14 Descending aorta

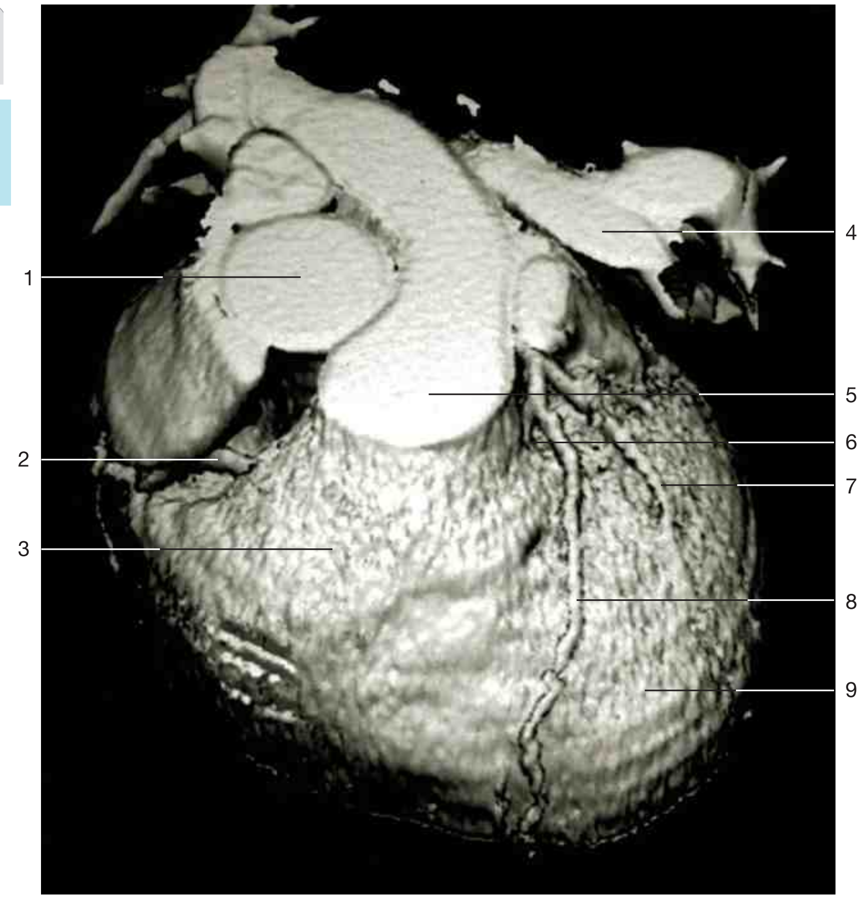


Heart with related vessels. Dissection of coronary arteries (anterior aspect, systolic phase of heart action).

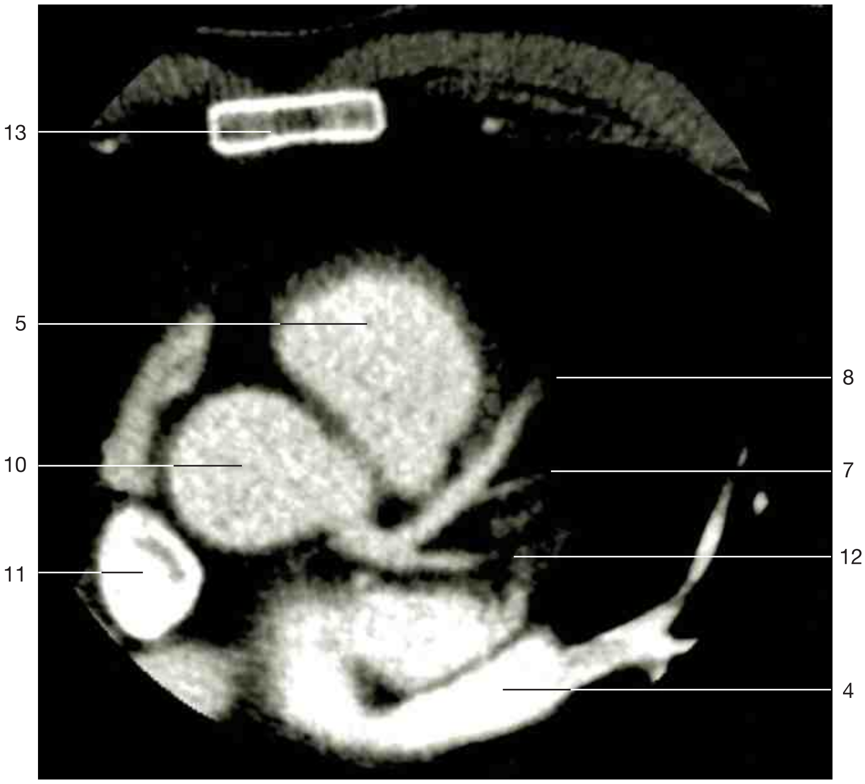
1 Brachiocephalic trunk
2 Right pulmonary artery
3 Superior vena cava
4 Right pulmonary veins
5 Ascending aorta
6 Right atrium
7 Right coronary artery
8 Right ventricle
9 Left common carotid artery and left subclavian artery
10 Descending aorta (thoracic part)
11 Ligamentum arteriosum (remnant of ductus arteriosus Botalli)
12 Left pulmonary artery
13 Aortic arch
14 Left pulmonary veins
15 Pulmonary trunk
16 Left atrium
17 Left coronary artery
18 Diagonal branch of left coronary artery
19 Interventricular branch of left coronary artery
20 Left ventricle
21 Right brachiocephalic vein
22 Thoracic wall
23 Liver
24 Aortic valve
25 Chordae tendineae
26 Papillary muscles
27 Stomach



Coronal section through the thorax at the level of the ascending aorta (MRI scan, courtesy of Prof. W. Bautz and R. Janka, M. D., University of Erlangen, Germany).



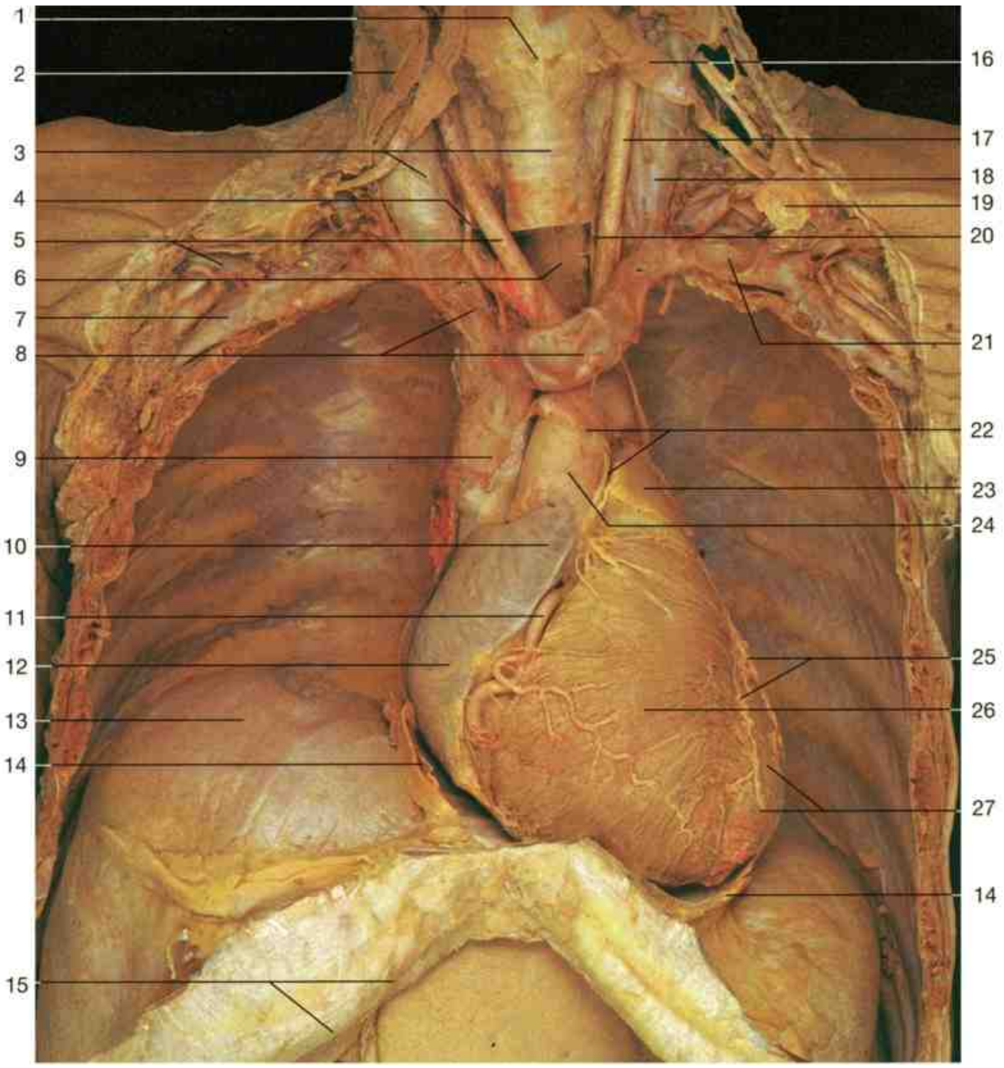
Human heart (3-D reconstruction of electron beam CT scans as "Shaded Surface Display"[1]).



Electron beam tomographic image of the human heart (axial section after injection of contrast medium[1]).

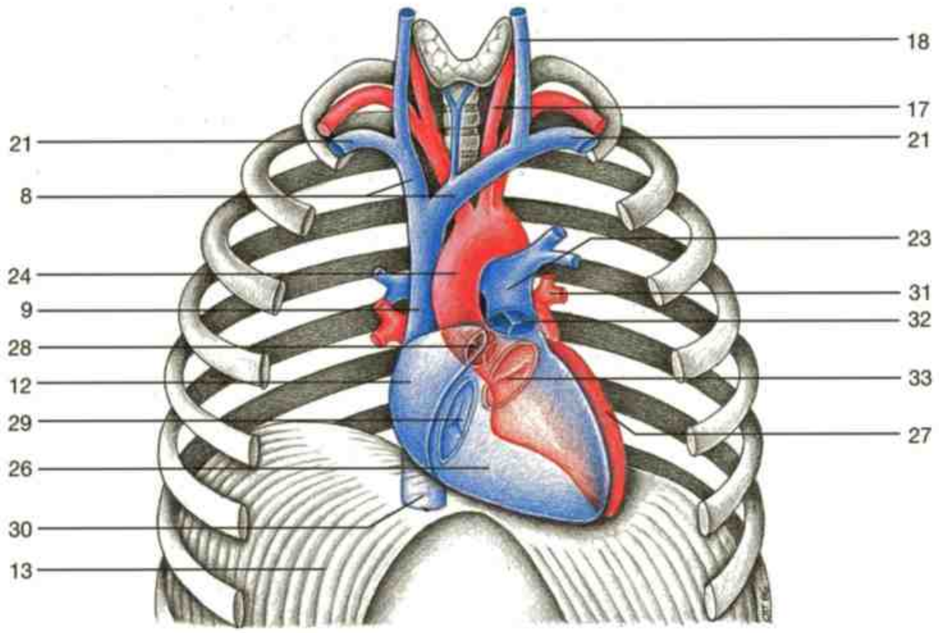
1 Ascending aorta
2 Right coronary artery
3 Right ventricle
4 Left atrium
5 Pulmonary trunk
6 Septal branch of left coronary artery
7 Diagonal branch
8 Anterior interventricular branch of left coronary artery
9 Left ventricle
10 Aortic root
11 Superior vena cava
12 Circumflex branch of left coronary artery
13 Sternum

[1] Courtesy of Drs. W. Moshage, S. Achenbach, and D. Ropers, Dept. of Internal Medicine II, University of Erlangen-Nürnberg, Germany.

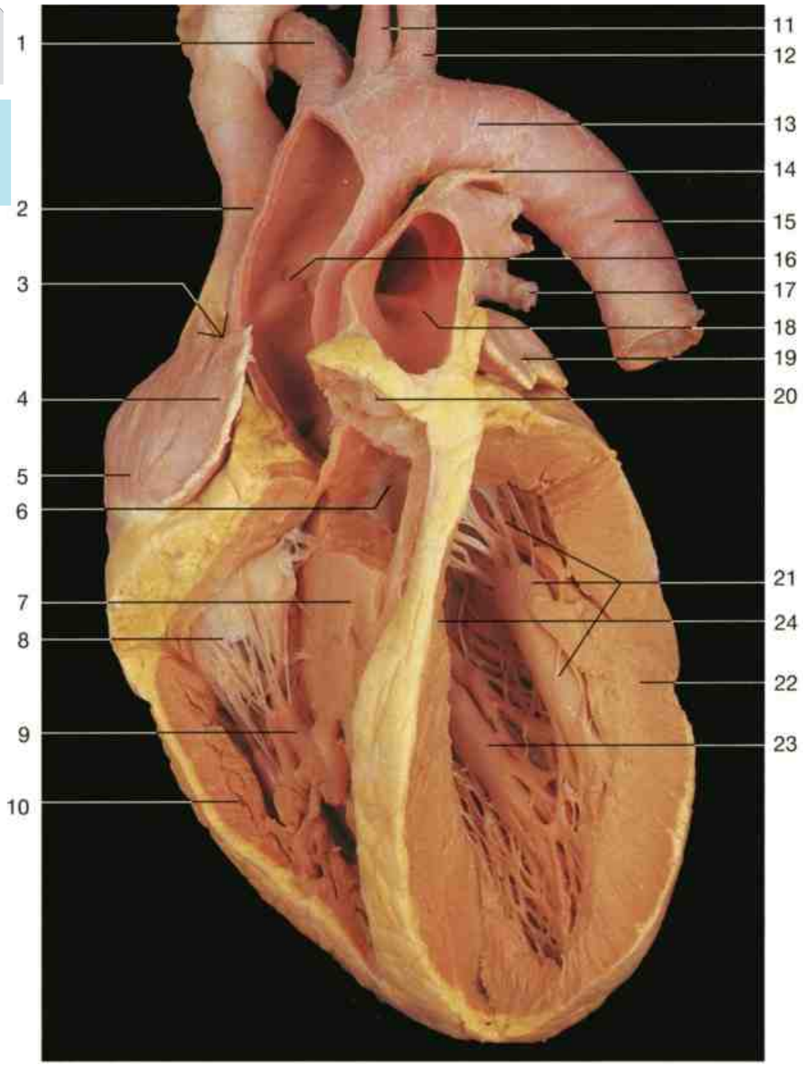


Heart and related vessels in situ (anterior aspect). Anterior thoracic wall, pericardium, and epicardium have been removed; trachea divided.

1 Larynx (thyroid cartilage)
2 Sternocleidomastoid muscle (divided)
3 Trachea (divided) and right internal jugular vein
4 Vagus nerve
5 Right common carotid artery and cephalic vein
6 Esophagus
7 Right axillary vein
8 Right and left brachiocephalic veins
9 Superior vena cava
10 Right auricle
11 Right coronary artery
12 Right atrium
13 Diaphragm
14 Pericardium (cut edges)
15 Costal margin
16 Omohyoid muscle
17 Left common carotid artery
18 Left internal jugular vein
19 Clavicle (divided)
20 Left recurrent laryngeal nerve
21 Subclavian vein
22 Pericardial reflection
23 Pulmonary trunk
24 Ascending aorta
25 Anterior interventricular sulcus and anterior interventricular branch of left coronary artery
26 Right ventricle
27 Left ventricle
28 Aortic valve
29 Tricuspid or right atrioventricular valve
30 Inferior vena cava
31 Pulmonary veins
32 Pulmonary valve
33 Left atrioventricular (bicuspid or mitral) valve

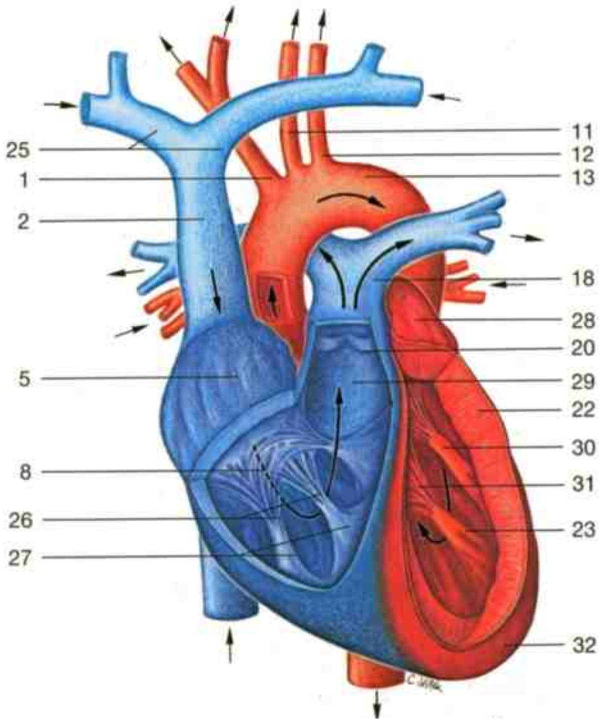


Heart in situ. Position of valves (anterior aspect). (Schematic drawing.)

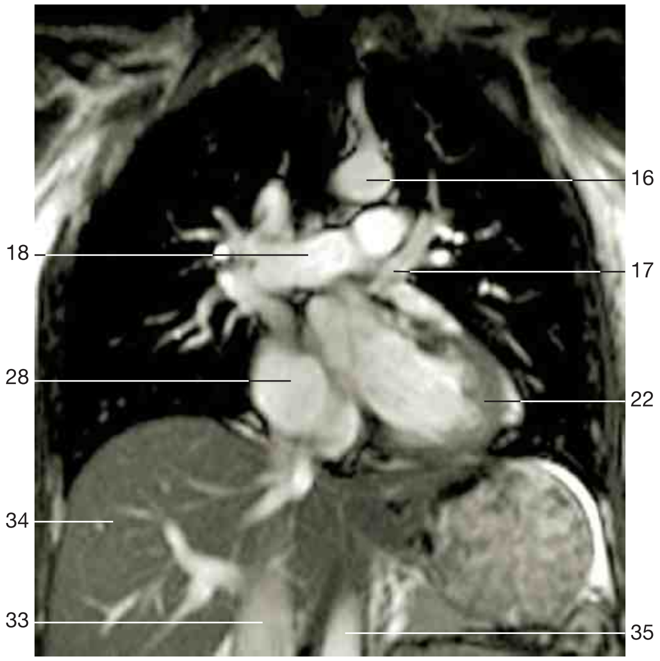


Anterior aspect of the heart. Dissection of the four valves.

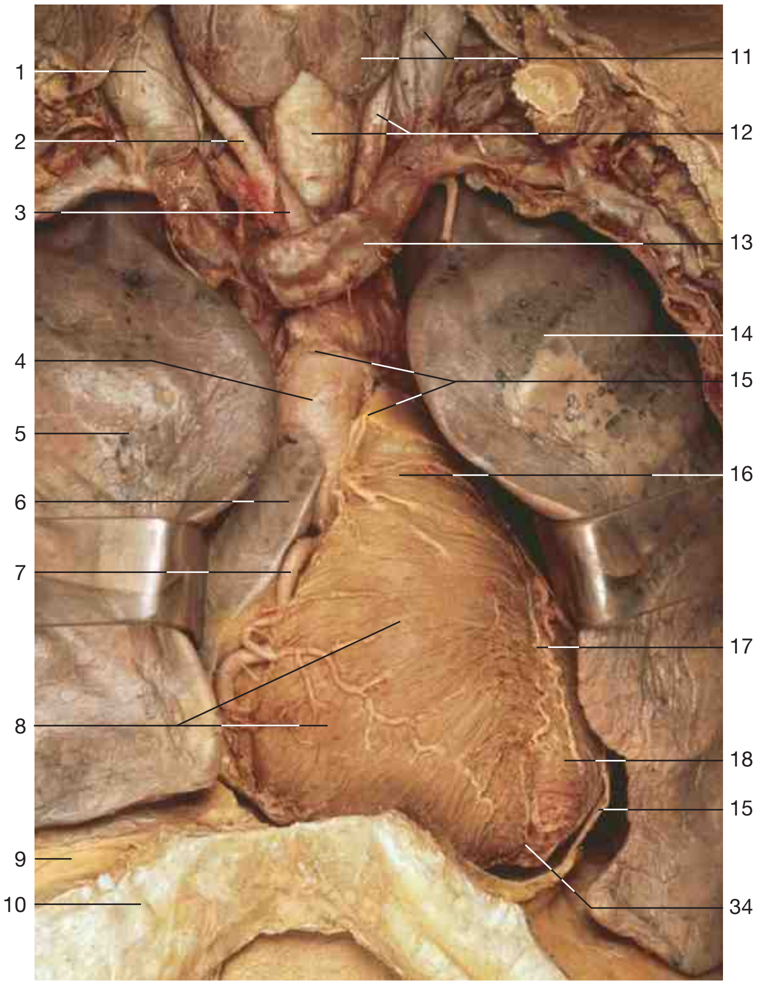
1 Brachiocephalic trunk
2 Superior vena cava
3 Sulcus terminalis
4 Right auricle
5 Right atrium
6 Aortic valve
7 Conus arteriosus (interventricular septum)
8 Right atrioventricular (tricuspid) valve
9 Anterior papillary muscle
10 Myocardium of right ventricle
11 Left common carotid artery
12 Left subclavian artery
13 Aortic arch
14 Ligamentum arteriosum (remnant of ductus arteriosus)
15 Thoracic aorta (descending aorta)
16 Ascending aorta
17 Left pulmonary vein
18 Pulmonary trunk
19 Left auricle
20 Pulmonic valve
21 Anterior papillary muscle with chordae tendineae
22 Myocardium of left ventricle
23 Posterior papillary muscle
24 Interventricular septum
25 Right and left brachiocephalic veins
26 Chordae tendineae
27 Papillary muscles of right ventricle
28 Left atrium
29 Infundibulum
30 Anterior papillary muscle of left ventricle
31 Left atrioventricular (bicuspid or mitral) valve and chordae tendineae
32 Apex of heart
33 Inferior vena cava
34 Liver
35 Aorta (pars abdominalis)



Circulation within the heart (anterior aspect). Arrows = direction of blood flow.

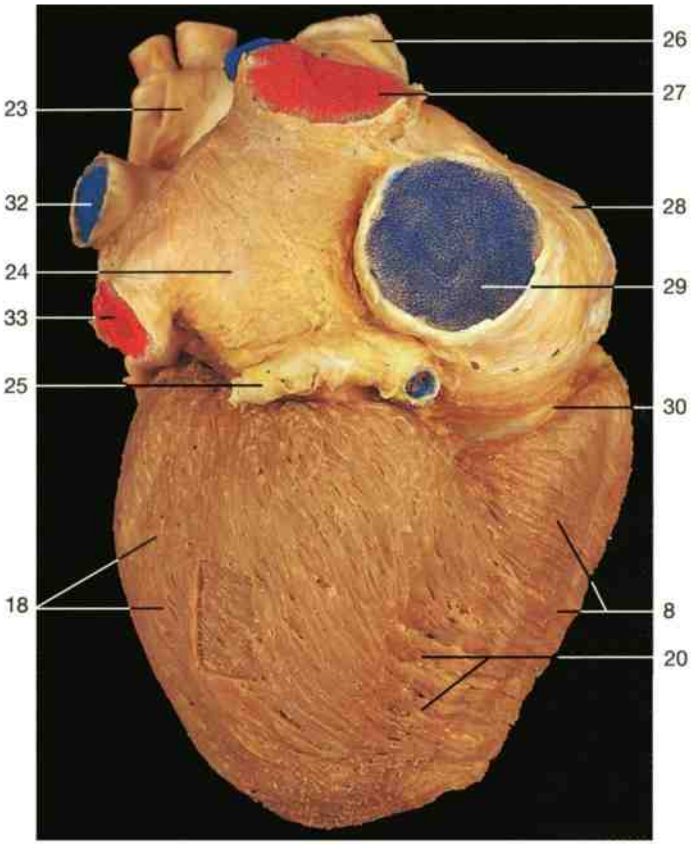


MRI scan of the heart (coronal section at the level of the left atrium; courtesy of Prof. W. Bautz and R. Janka, M. D., University of Erlangen, Germany).

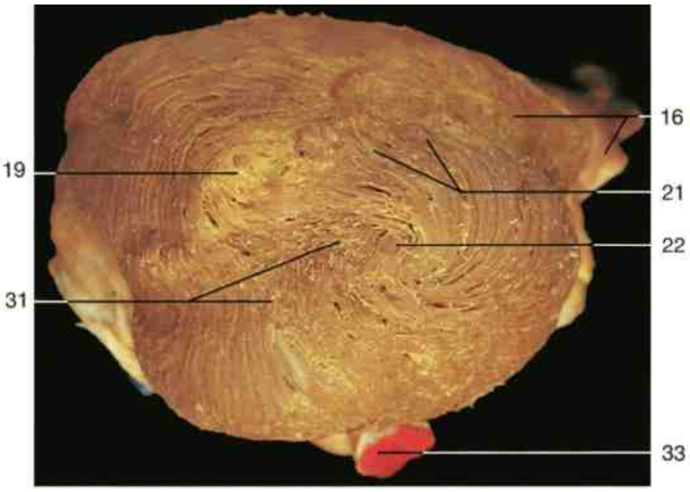


Heart in situ. Myocardium and coronary arteries (anterior aspect).

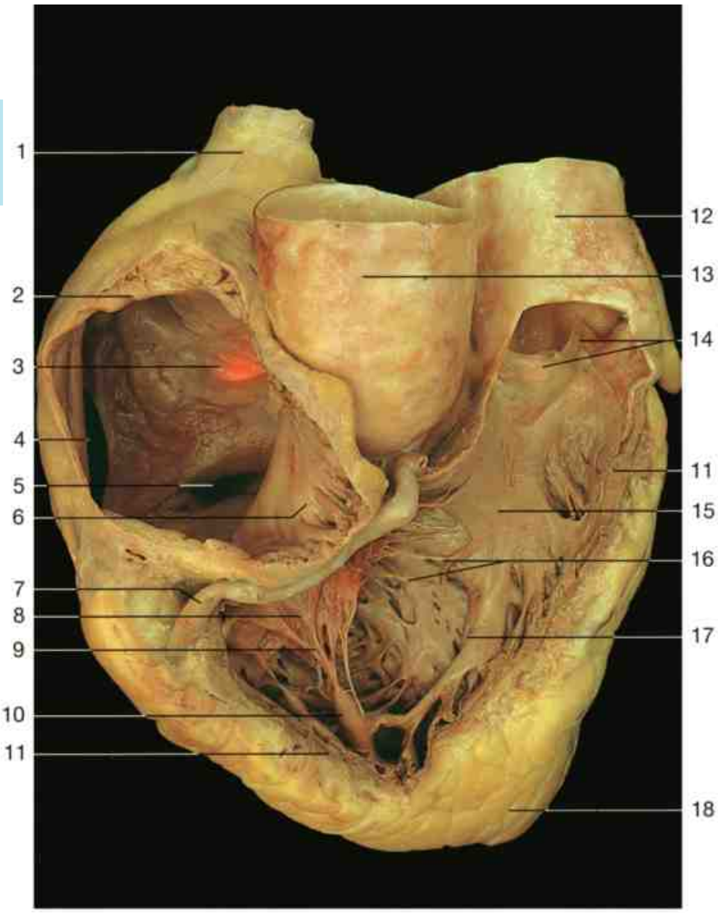
1 Internal jugular vein
2 Common carotid artery
3 Brachiocephalic trunk
4 Ascending aorta
5 Right lung
6 Right auricle
7 Right coronary artery
8 Myocardium of right ventricle
9 Diaphragm
10 Costal margin
11 Thyroid gland and internal jugular vein
12 Trachea and left common carotid artery
13 Left brachiocephalic vein
14 Left lung
15 Pericardium (cut edge)
16 Pulmonary trunk
17 Anterior interventricular artery
18 Myocardium of left ventricle
19 Muscular vortex (right ventricle)
20 Posterior interventricular sulcus
21 Anterior interventricular sulcus
22 Muscular vortex (left ventricle)
23 Aortic arch
24 Left atrium
25 Coronary sinus
26 Superior vena cava
27 Right pulmonary vein
28 Right atrium
29 Inferior vena cava
30 Coronary sulcus
31 Myocardium of left ventricle
32 Left pulmonary artery
33 Left pulmonary vein
34 Apex of heart



Heart (posterior aspect). The myocardium of the left ventricle has been fenestrated to show the muscle fiber bundles of the deeper layer with their more circular course.

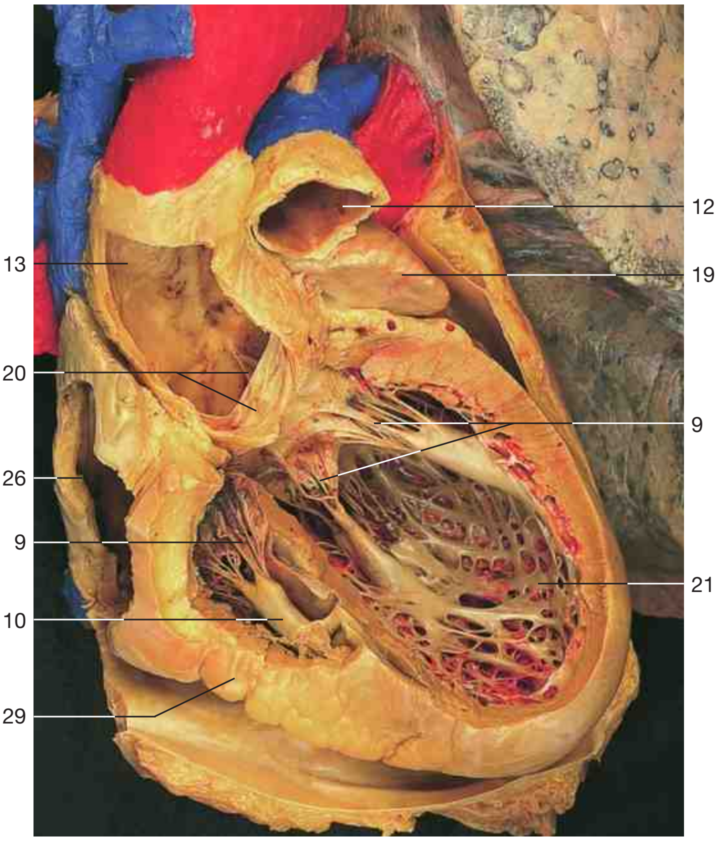


Vortex of cardiac muscle fibers (from below).

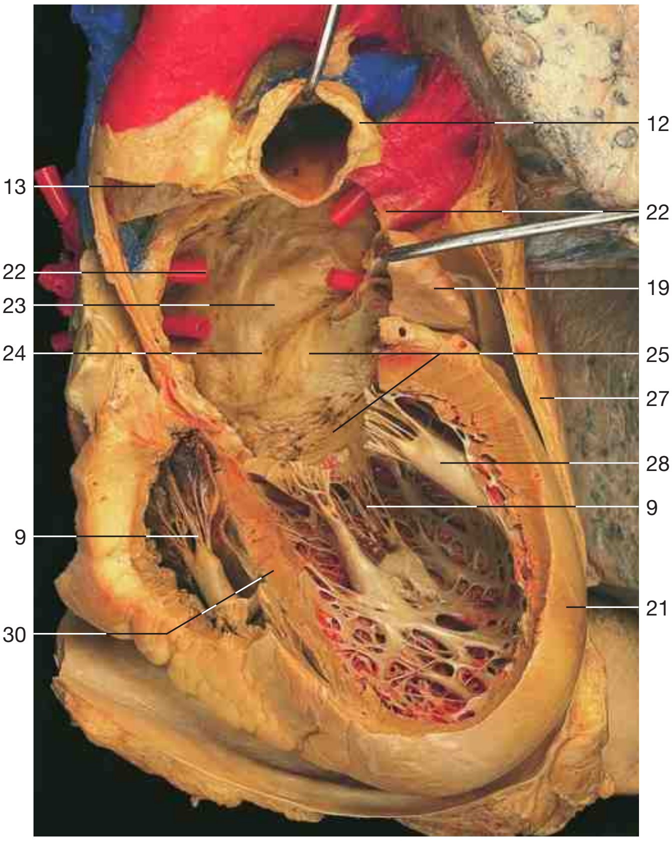


Right heart (anterior aspect). Anterior wall of right atrium and ventricle removed.

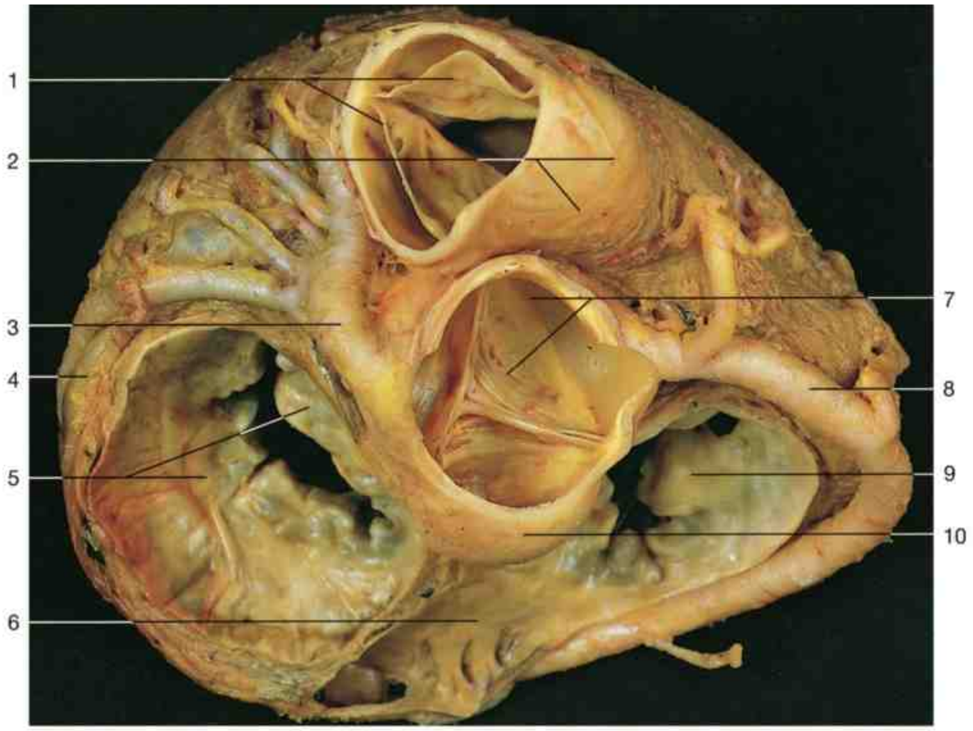
1 Superior vena cava
2 Crista terminalis
3 Fossa ovalis
4 Opening of inferior vena cava
5 Opening of coronary sinus
6 Right auricle
7 Right coronary artery and coronary sulcus
8 Anterior cusp of tricuspid valve
9 Chordae tendineae
10 Anterior papillary muscle
11 Myocardium
12 Pulmonary trunk
13 Ascending aorta
14 Pulmonic valve
15 Conus arteriosus (interventricular septum)
16 Septal papillary muscles
17 Septomarginal trabecula or moderator band
18 Apex of heart
19 Left auricle
20 Aortic valve
21 Left ventricle
22 Pulmonary veins
23 Position of fossa ovalis
24 Left atrium
25 Left atrioventricular (bicuspid or mitral) valve
26 Right atrium
27 Pericardium
28 Posterior papillary muscle
29 Right ventricle
30 Interventricular septum



Heart, left ventricle with mitral valve, papillary muscles, and aortic valve (anterior portion of the heart removed).

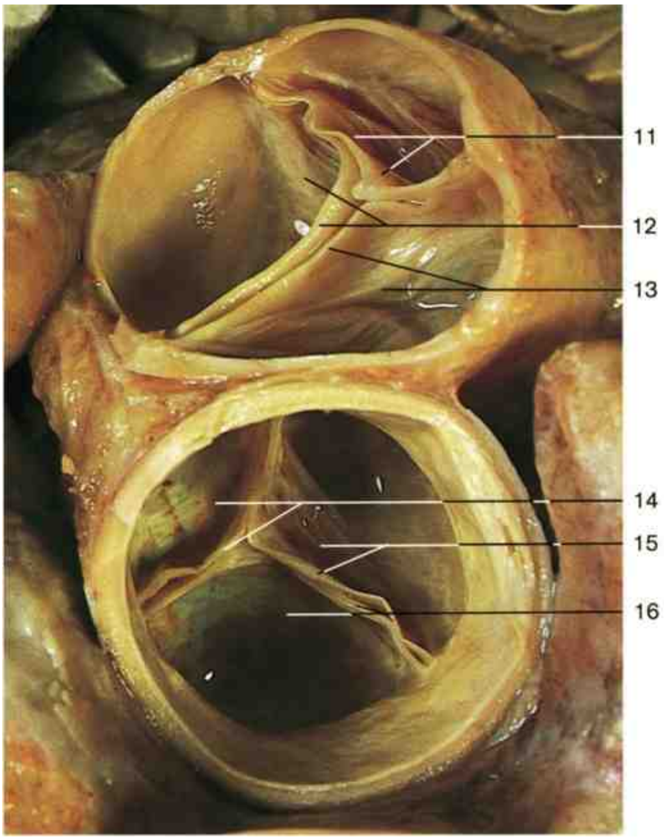


Heart, left ventricle, and atrium (opened) showing the posterior part of the mitral valve with papillary muscles.

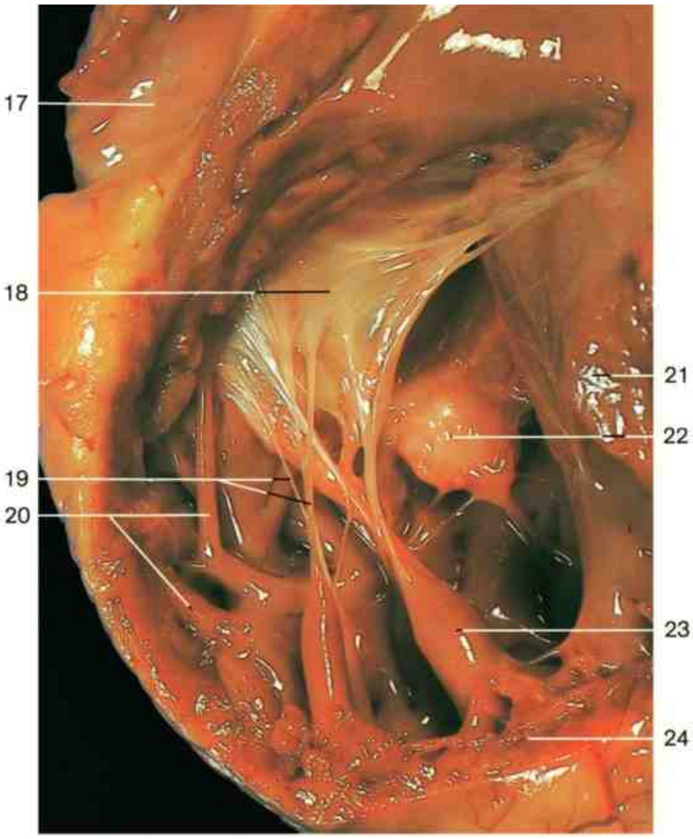


Valves of heart (superior aspect). Left and right atria removed. Dissection of coronary arteries. Above: anterior wall of the heart.

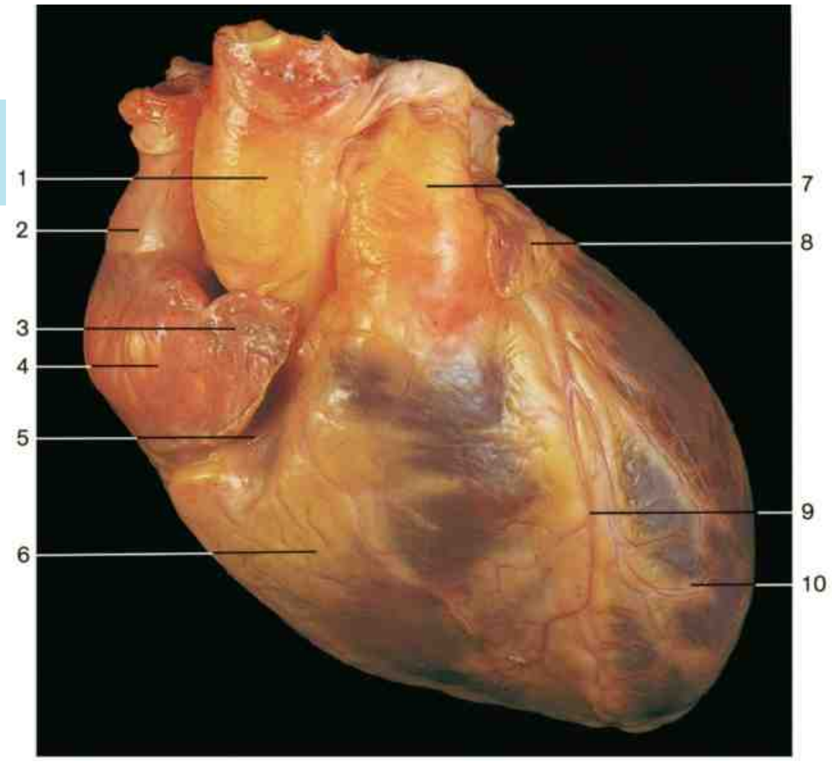
1	Pulmonic valve
2	Sinus of pulmonary trunk
3	Left coronary artery
4	Great cardiac vein
5	Left atrioventricular (mitral) valve
6	Coronary sinus
7	Aortic valve
8	Right coronary artery
9	Right atrioventricular (tricuspid) valve
10	Bulb of aorta
11	Anterior semilunar cusp of pulmonic valve
12	Left semilunar cusp of pulmonic valve
13	Right semilunar cusp of pulmonic valve
14	Left semilunar cusp of aortic valve
15	Right semilunar cusp of aortic valve
16	Posterior semilunar cusp of aortic valve
17	Right atrium
18	Anterior cusp of tricuspid valve
19	Chordae tendineae
20	Trabeculae carneae
21	Interventricular septum
22	Septal cusp of tricuspid valve
23	Anterior papillary muscle
24	Myocardium of right ventricle



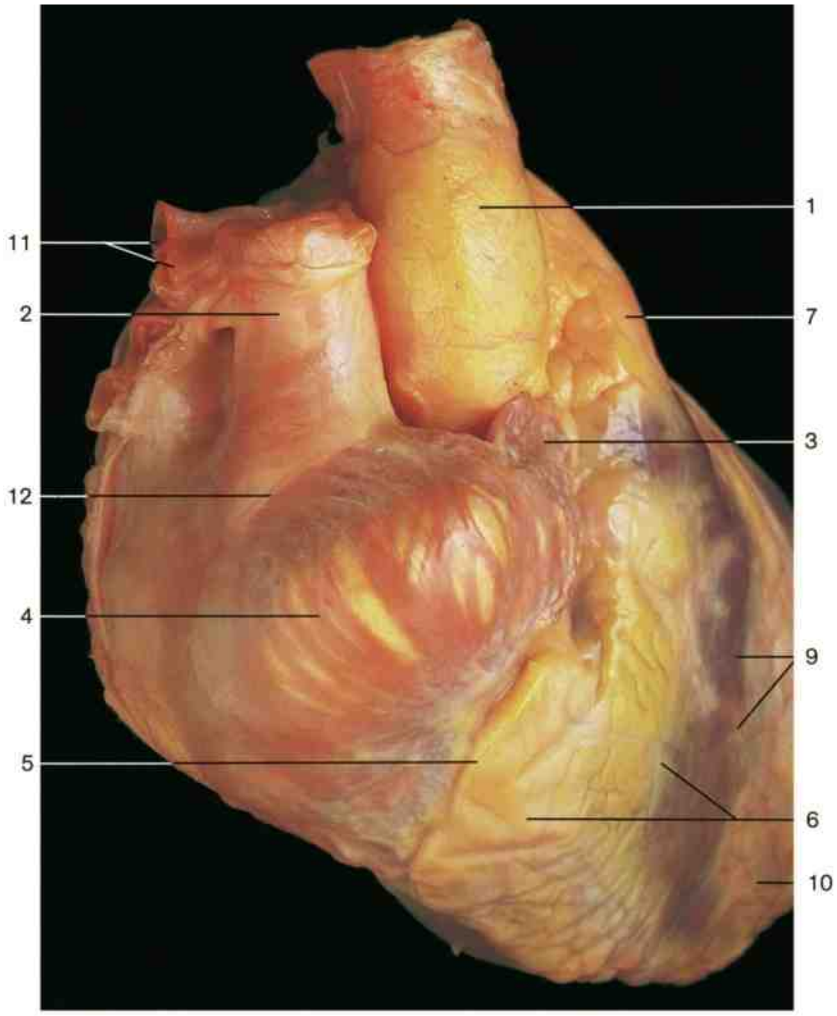
Pulmonic and aortic valves (from above). Anterior wall of the heart at the top. Both valves are closed.



Right atrioventricular (tricuspid) valve (anterior aspect after removal of the anterior wall of the right ventricle).

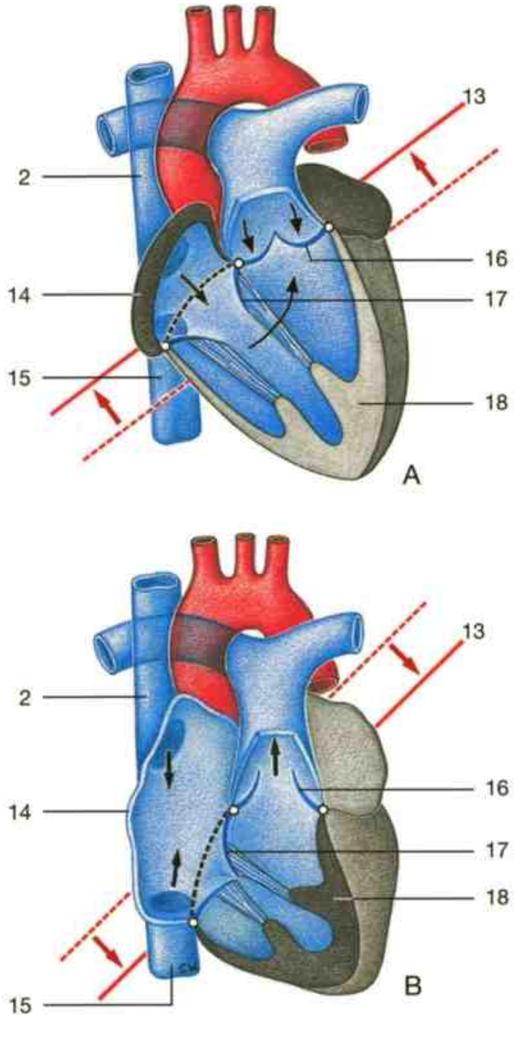


Heart, fixed in **diastole** (anterior aspect). The ventricles are relaxed, atria contracted.



Heart, fixed in **systole** (antero-lateral aspect). The ventricles are contracted, atria dilated.

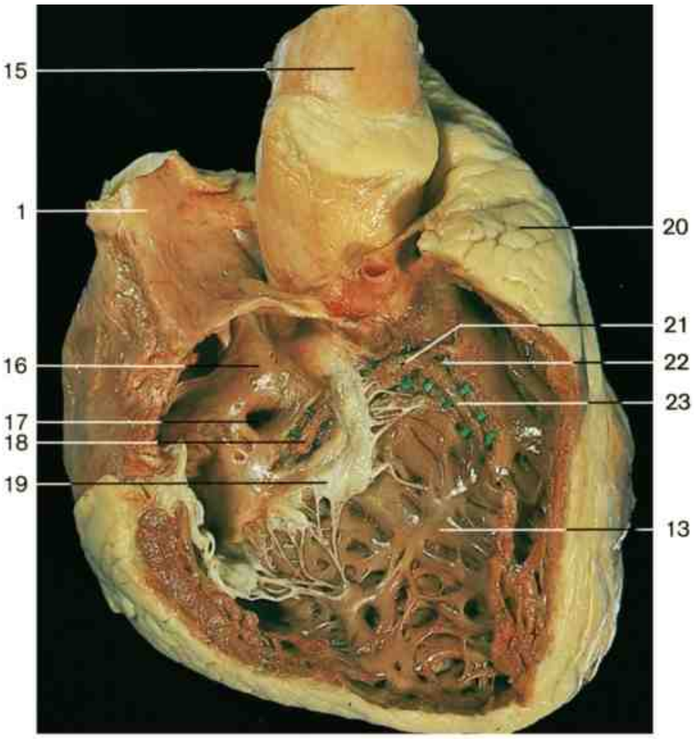
1 Ascending aorta
2 Superior vena cava
3 Right auricle
4 Right atrium
5 Coronary sulcus
6 Right ventricle
7 Pulmonary trunk
8 Left auricle
9 Anterior interventricular sulcus
10 Left ventricle
11 Right pulmonary artery
12 Sulcus terminalis with sinu-atrial node
13 Line indicating plane of position of valves
14 Myocardium of right atrium
15 Inferior vena cava
16 Valve of pulmonary trunk
17 Tricuspid valve
18 Myocardium of right ventricle



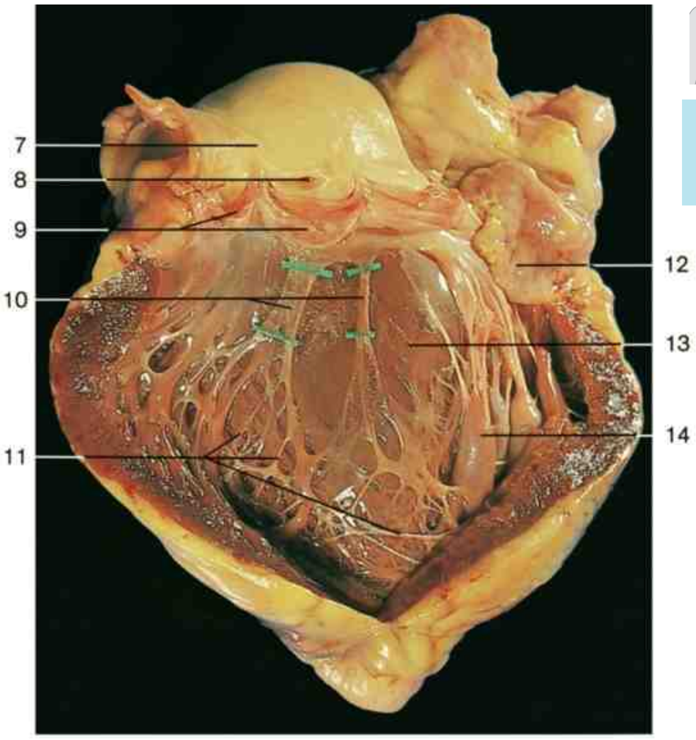
Morphological changes during heart movements. Note the changes in position of the valves (red arrows). Contracted portions of heart are indicated in black.

A. **Diastole:** muscles of the ventricles relaxed, atrioventricular valves open, semilunar valves closed.

B. **Systole:** muscles of ventricles contracted, atrioventricular valves closed, semilunar valves open.

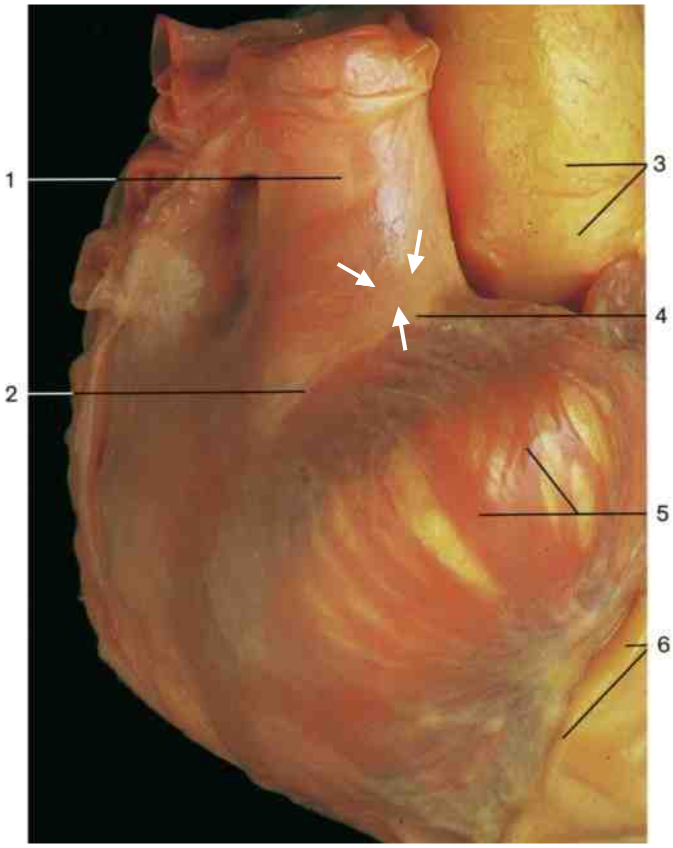


Right ventricle, dissection of **atrioventricular node, atrioventricular bundle (bundle of His),** and **right limb or bundle branch** (probes).

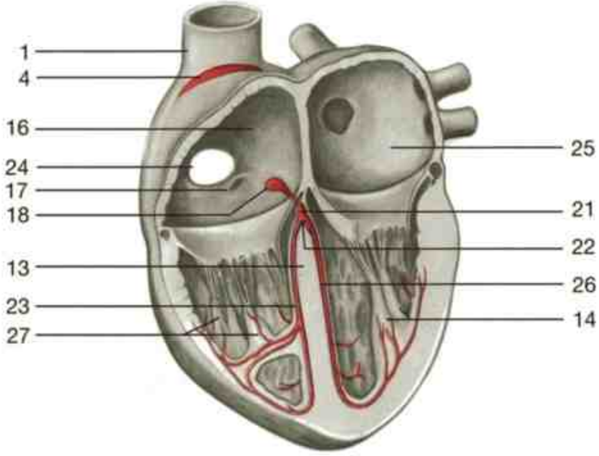


Left ventricle, dissection of left **limb or bundle branch of conducting system** (probes).

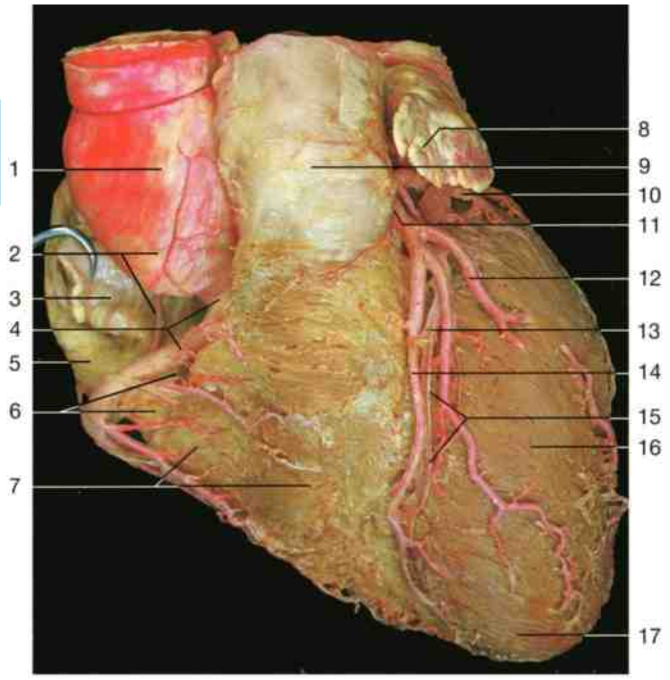
1 Superior vena cava
2 Sulcus terminalis
3 Bulb of aorta
4 Sinu-atrial node (arrows)
5 Muscle fiber bundles of right atrium
6 Coronary sulcus (with right coronary artery)
7 Aortic sinus
8 Entrance to left coronary artery
9 Aortic valve
10 Branches of left bundle branch
11 Purkinje fibers
12 Left auricle
13 Interventricular septum
14 Papillary muscles
15 Ascending aorta
16 Right atrium
17 Opening of coronary sinus
18 Atrioventricular node
19 Septal cusp of tricuspid valve
20 Pulmonary trunk
21 Atrioventricular bundle (bundle of His)
22 Bifurcation of atrioventricular bundle
23 Right bundle branch
24 Inferior vena cava
25 Left atrium
26 Left bundle branch
27 Papillary muscles with Purkinje fibers



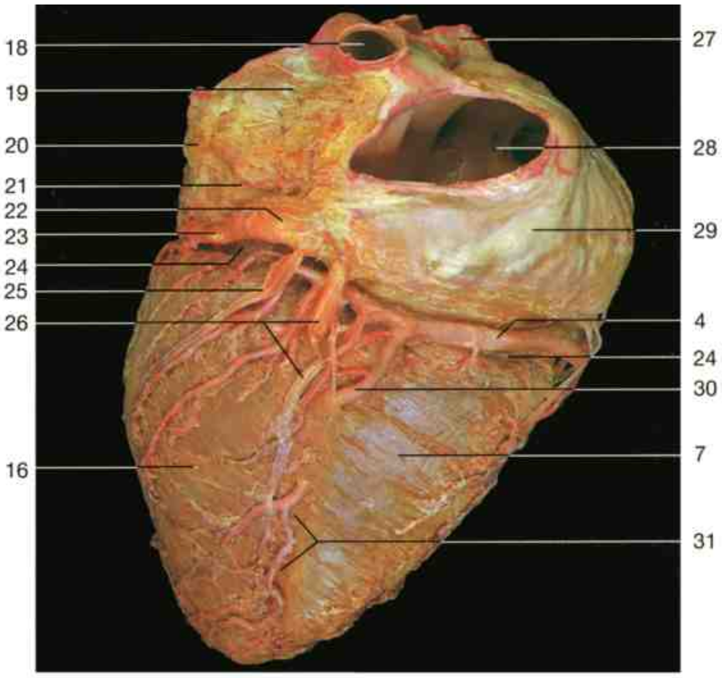
Right atrium, anterior wall, showing the location of the **sinu-atrial node** (arrows).



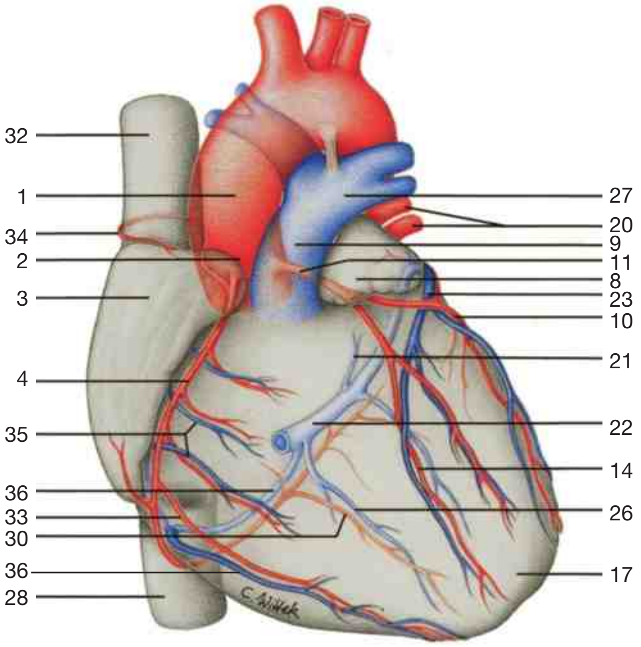
Conducting system of the heart (schematic drawing).



Coronary arteries (anterior aspect). The epicardium and subepicardial fatty tissue have been removed. The arteries have been injected with red resin from the aorta.

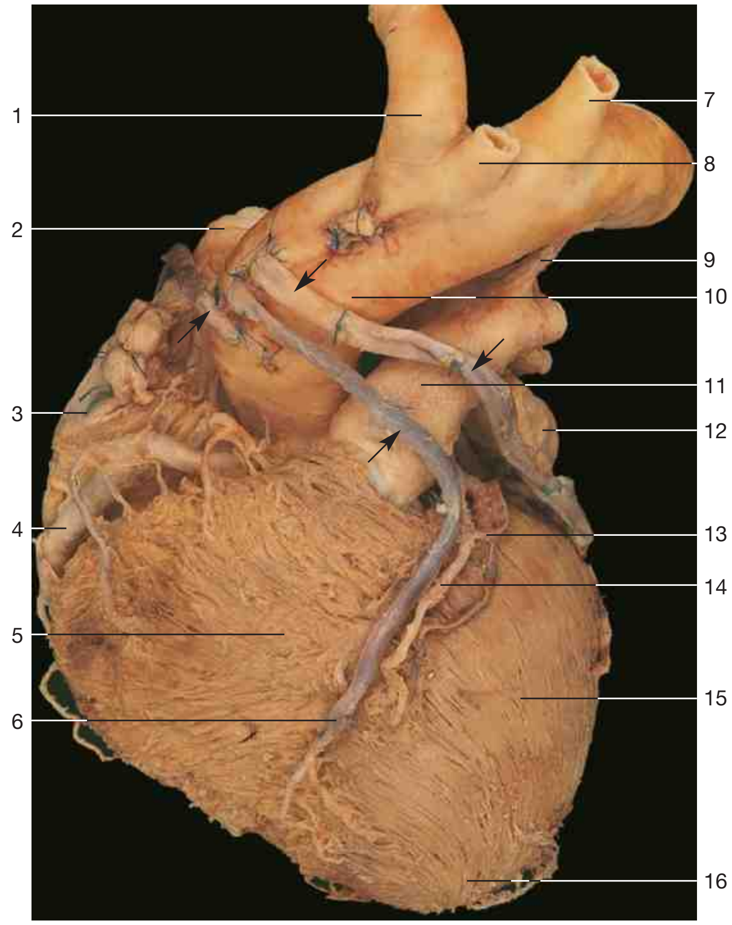


Right coronary artery and veins of the heart (dorsal aspect). The epicardium and subepicardial fatty tissue have been removed.



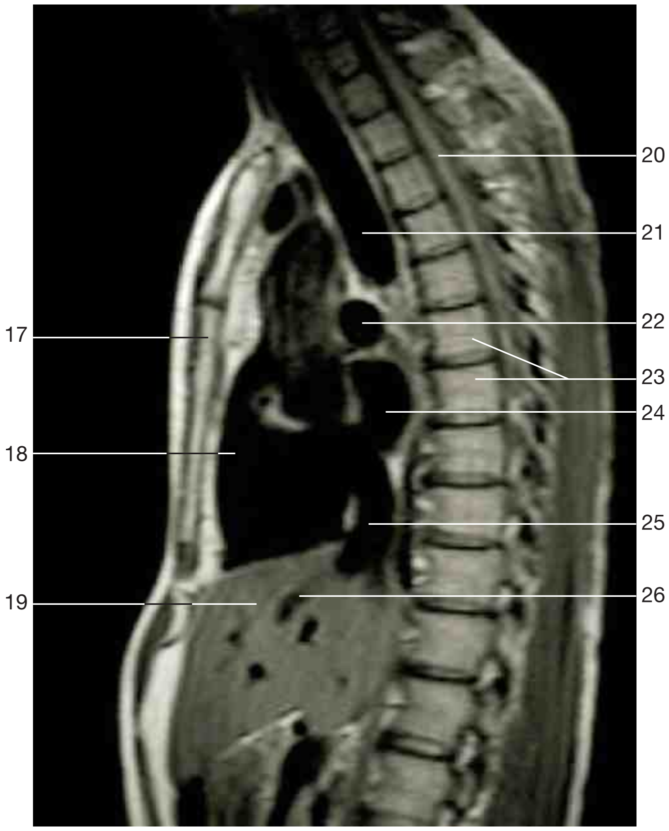
Vessels of the heart. Coronary arteries (red) and veins (blue) of the heart (anterior aspect).

1	Ascending aorta
2	Aortic bulb and (in the above specimen) sinu-atrial branch of right coronary artery
3	Right auricle
4	Right coronary artery
5	Right atrium
6	Coronary sulcus
7	Right ventricle
8	Left auricle
9	Pulmonary trunk
10	Circumflex branch of left coronary artery
11	Left coronary artery
12	Diagonal branch of left artery
13	Great cardiac vein
14	Anterior interventricular artery
15	Anterior interventricular sulcus
16	Left ventricle
17	Apex of heart
18	Right pulmonary vein
19	Left atrium
20	Left pulmonary veins
21	Oblique vein of left atrium (Marshall's vein)
22	Coronary sinus
23	Great cardiac vein
24	Coronary sulcus (posterior portion)
25	Posterior vein of left ventricle
26	Middle cardiac vein
27	Left pulmonary artery
28	Inferior vena cava
29	Right atrium
30	Posterior interventricular branch of right coronary artery
31	Posterior interventricular sulcus
32	Superior vena cava
33	Right marginal branch
34	Branch of sinu-atrial node
35	Minimal cardiac veins
36	Small cardiac vein

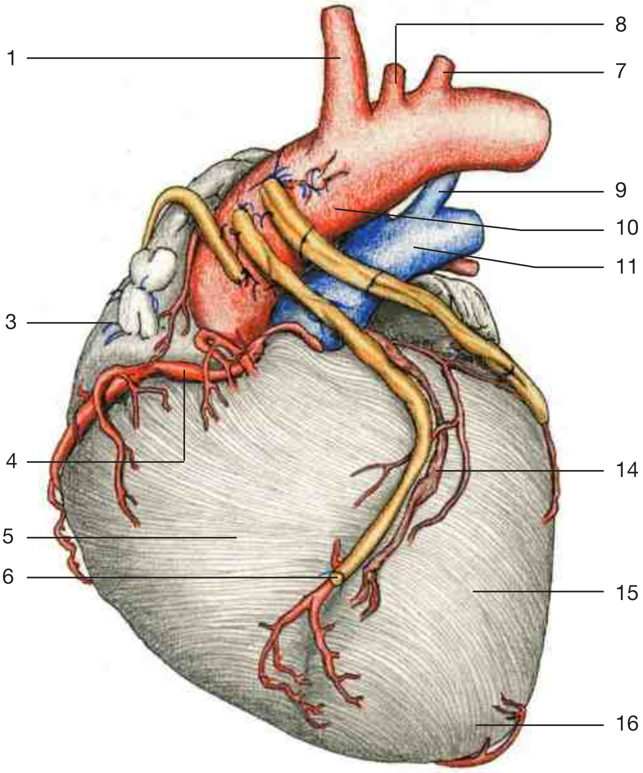


Heart, coronary vessels after implantation of three bypass vessels (anterior aspect). The ductus arteriosus (9) is still open.

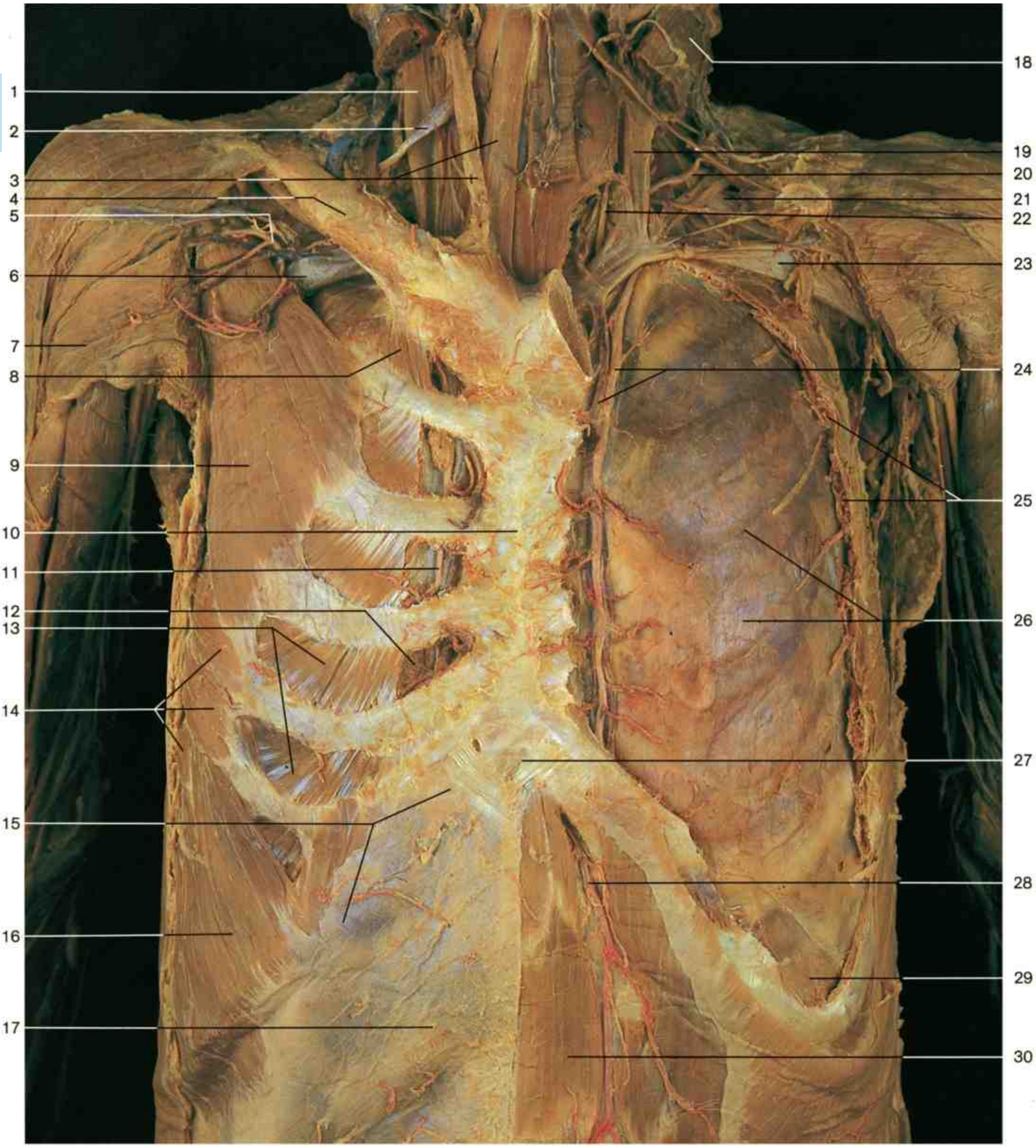
1 Brachiocephalic trunk
2 Superior vena cava
3 Right atrium
4 Right coronary artery
5 Right ventricle
6 Connection of one of the bypass vessels with the anterior interventricular artery
7 Left subclavian artery
8 Left common carotid artery
9 Ductus arteriosus (Botalli) (still open)
10 Ascending aorta with three bypass vessels implanted
11 Pulmonary trunk
12 Left atrium
13 Circumflex branch of left coronary artery
14 Anterior interventricular branch of left coronary artery
15 Left ventricle
16 Apex of heart
17 Sternum
18 Right ventricle
19 Liver
20 Spinal cord
21 Trachea
22 Aorta
23 Body of thoracic vertebrae
24 Pulmonary artery
25 Inferior vena cava
26 Hepatic vein



Sagittal section through the thoracic cavity (MRI scan, courtesy of Prof. W. Bautz and R. Janka, M. D., University of Erlangen, Germany).

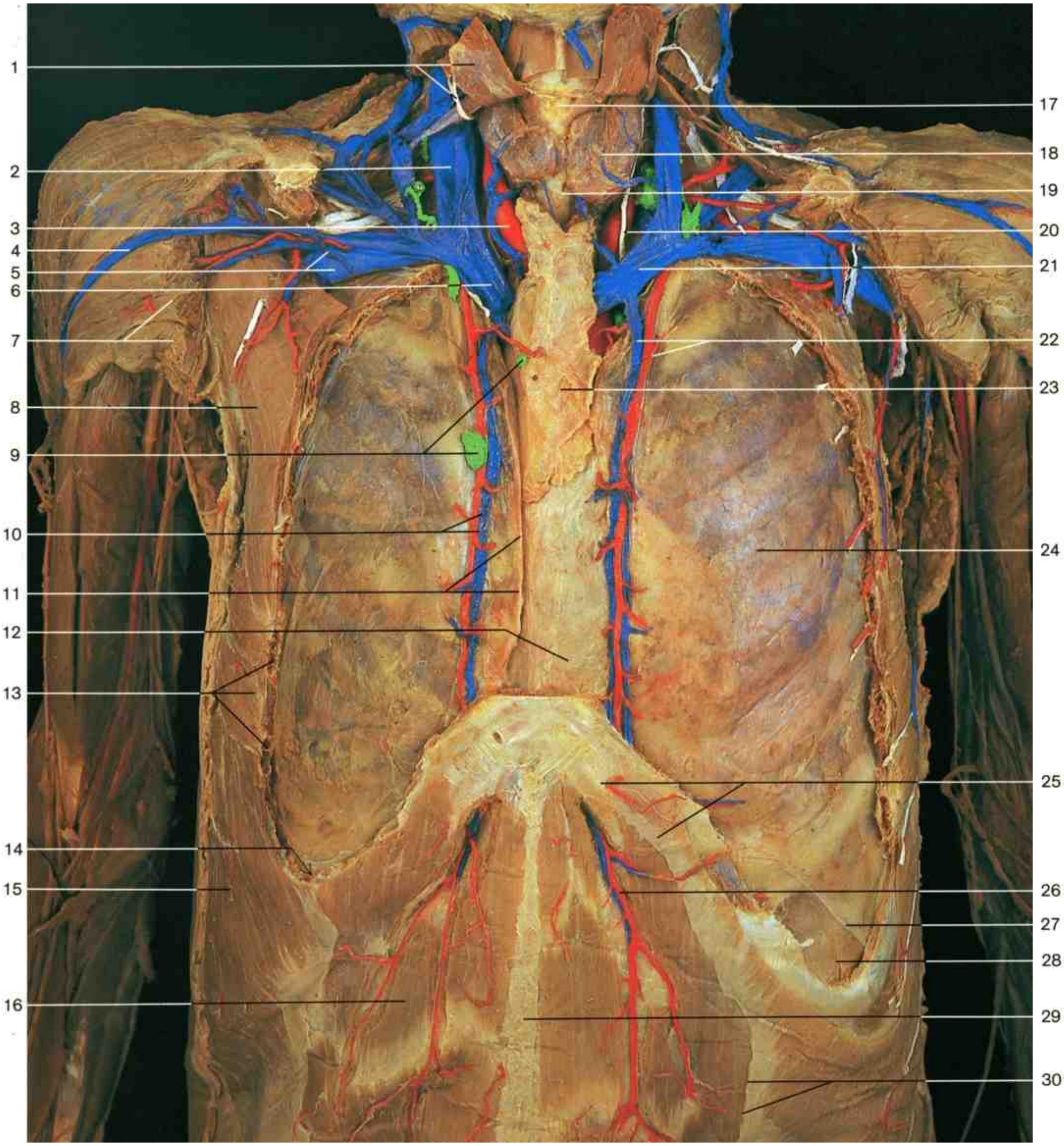


Heart, coronary vessels after implantation of three bypass vessels (yellow) (schematic drawing of the specimen above).



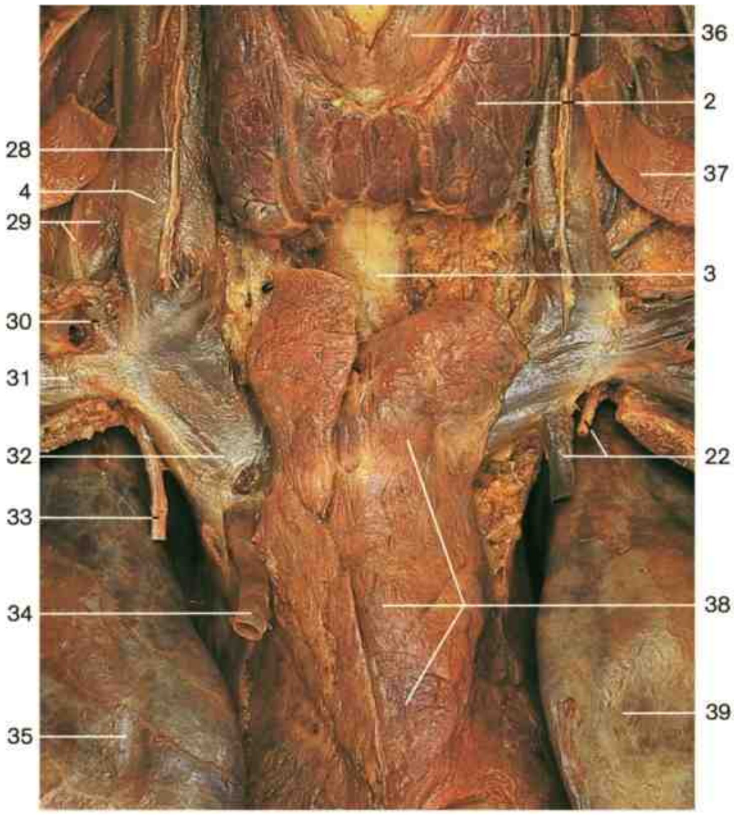
Thoracic organs (ventral aspect). The left clavicle and ribs have been partially removed, and the right intercostal spaces have been opened to show the internal thoracic vein and artery.

1 Right internal jugular vein
2 Omohyoid muscle
3 Sternohyoid muscle and external jugular vein
4 Clavicle
5 Thoraco-acromial artery
6 Right subclavian vein
7 Pectoralis major muscle
8 External intercostal muscle
9 Pectoralis minor muscle
10 Body of sternum
11 Right internal thoracic artery and vein
12 Fascicles of transversus thoracis muscle
13 Internal intercostal muscles
14 Serratus anterior muscle
15 Costal margin
16 External abdominal oblique muscle
17 Anterior sheath of rectus abdominis muscle
18 Sternocleidomastoid muscle
19 Left internal jugular vein
20 Transverse cervical artery
21 Brachial plexus
22 Vagus nerve
23 Left axillary vein
24 Left internal thoracic artery and vein
25 Ribs and thoracic wall (cut)
26 Costal pleura
27 Xiphoid process
28 Superior epigastric artery
29 Diaphragm
30 Rectus abdominis muscle

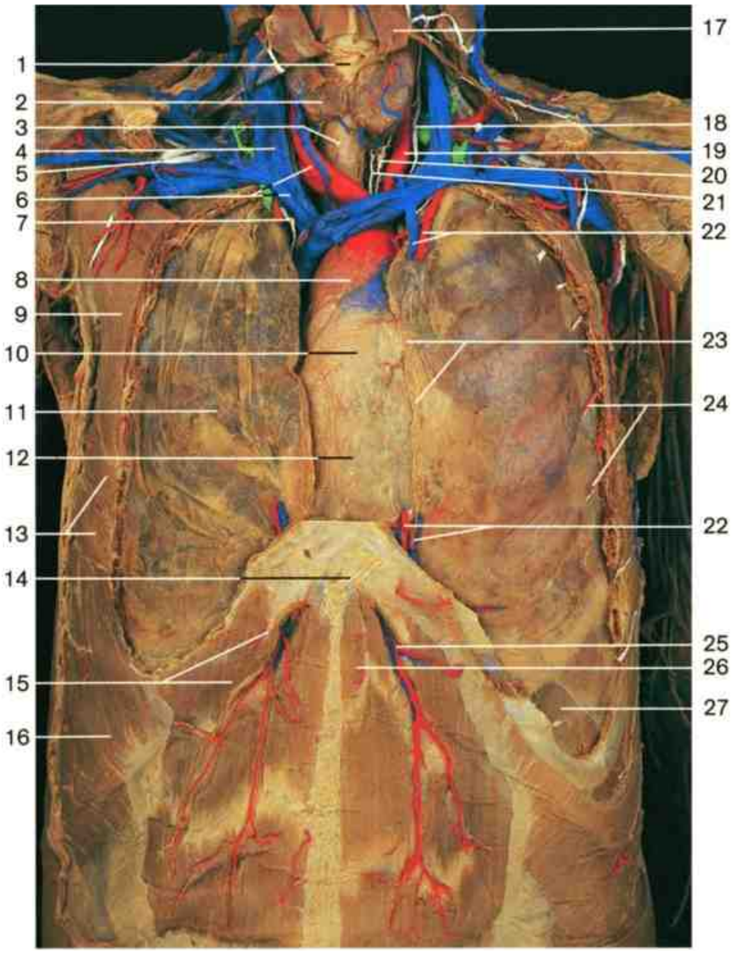


Thoracic organs, anterior mediastinum, and pleura (ventral aspect). Ribs, clavicle, and sternum have been partly removed. Red = arteries; blue = veins; green = lymph vessels and nodes.

1 Sternothyroid muscle and its nerve (a branch of the ansa cervicalis)
2 Right internal jugular vein
3 Right common carotid artery
4 Cephalic vein
5 Right subclavian vein
6 Right brachiocephalic vein
7 Pectoralis major muscle (divided)
8 Pectoralis minor muscle (divided)
9 Parasternal lymph nodes
10 Internal thoracic artery and vein
11 Anterior margin of costal pleura
12 Pericardium
13 Fifth and sixth ribs (divided) and serratus anterior muscle
14 Costodiaphragmatic recess
15 External abdominal oblique muscle
16 Rectus abdominis muscle
17 Larynx (thyroid cartilage)
18 Thyroid gland
19 Trachea
20 Left vagus nerve
21 Left brachiocephalic vein
22 Left internal thoracic artery and vein
23 Thymus
24 Costal pleura
25 Costal margin
26 Superior epigastric artery
27 Margin of costal pleura
28 Diaphragm
29 Linea alba
30 Cut edge of anterior sheath of rectus abdominis muscle

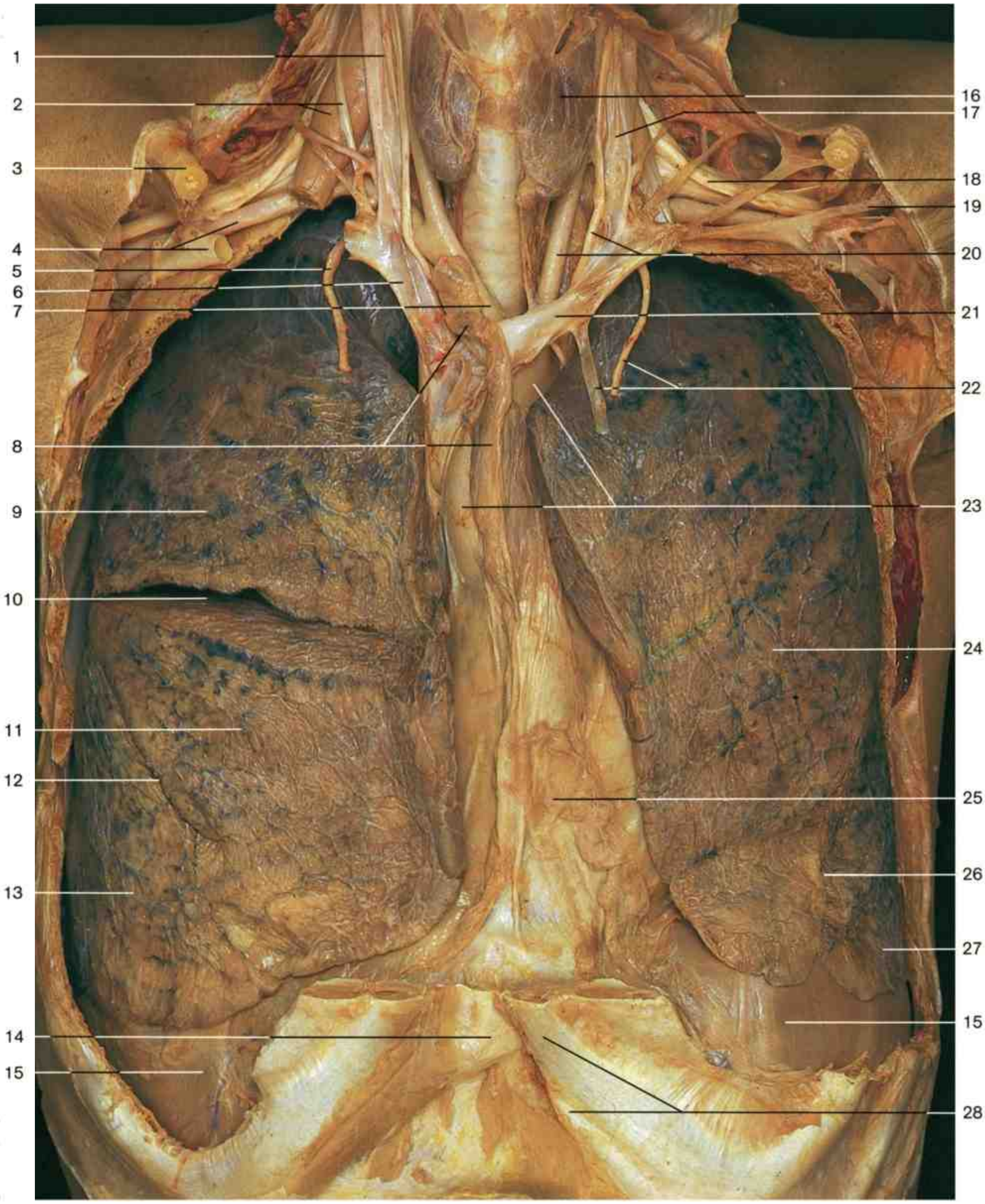


The **thymus** above the heart, showing its position and size.



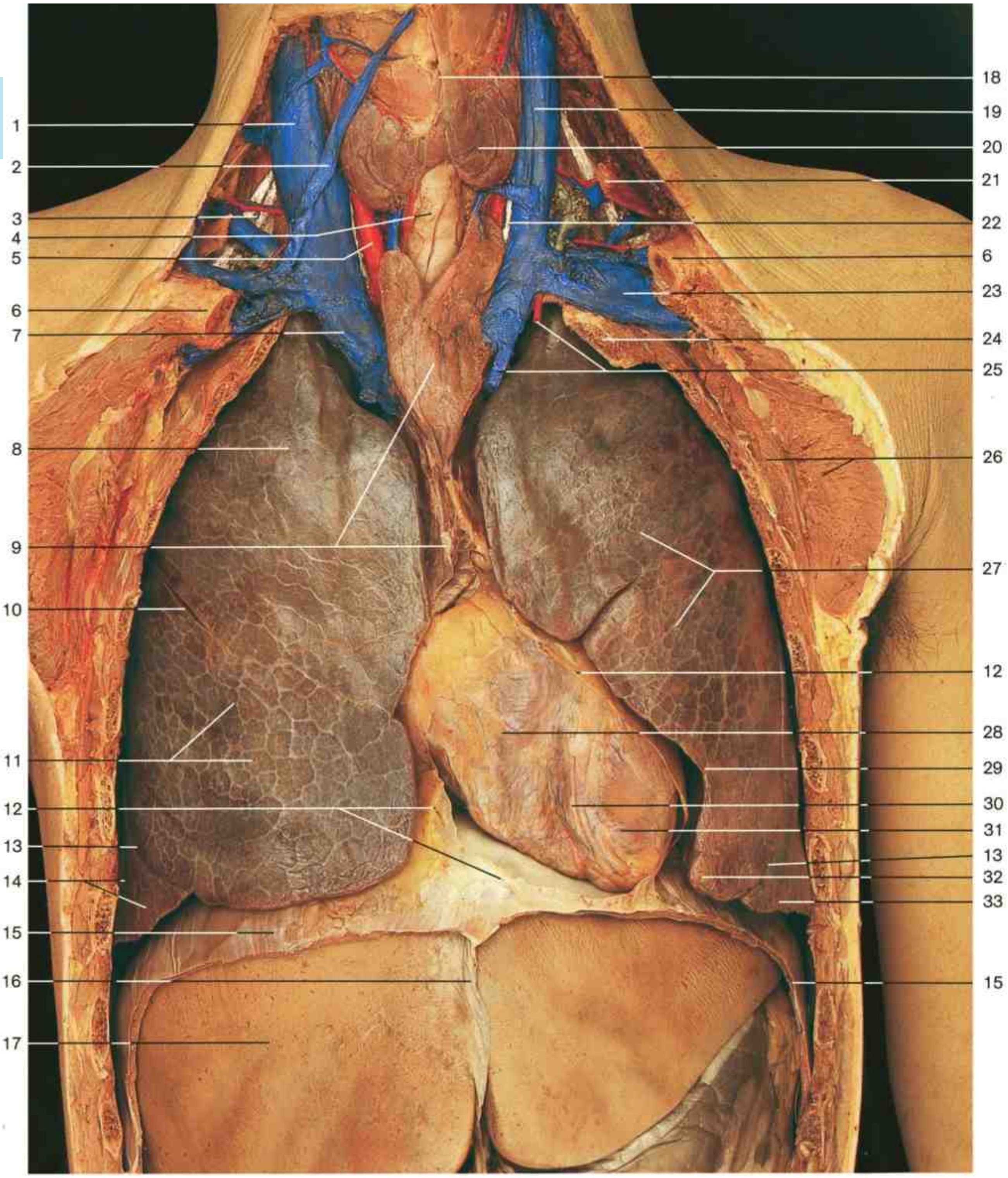
1 Larynx (thyroid cartilage)
2 Thyroid gland
3 Trachea
4 Internal jugular vein
5 Brachial plexus
6 Right brachiocephalic vein and common carotid artery
7 Right phrenic nerve
8 Ascending aorta
9 Pectoralis minor muscle (divided)
10 Pulmonary trunk (covered by pericardium)
11 Costal pleura
12 Pericardium and heart
13 Serratus anterior muscle
14 Xiphoid process
15 Costal margin
16 External abdominal oblique muscle
17 Sternothyroid muscle (divided and reflected)
18 Vagus nerve
19 Left common carotid artery
20 Left sympathetic trunk
21 Left recurrent laryngeal nerve
22 Left internal thoracic artery and vein (divided)
23 Margin of costal pleura
24 Intercostal nerves and vessels
25 Superior epigastric artery
26 Rectus abdominis muscle
27 Diaphragm
28 Ansa cervicalis
29 Phrenic nerve and scalenus anterior muscle
30 External jugular vein (divided)
31 Right subclavian vein
32 Right brachiocephalic vein
33 Internal thoracic artery (divided)
34 Internal thoracic vein (divided)
35 Right lung
36 Cricothyroid muscle
37 Omohyoid muscle
38 Thymus
39 Left lung

Thoracic organs (ventral aspect). The internal thoracic vessels have been removed, and the anterior margins of the pleura and lungs have been slightly reflected to display the anterior and middle mediastinum, including the heart and great vessels.



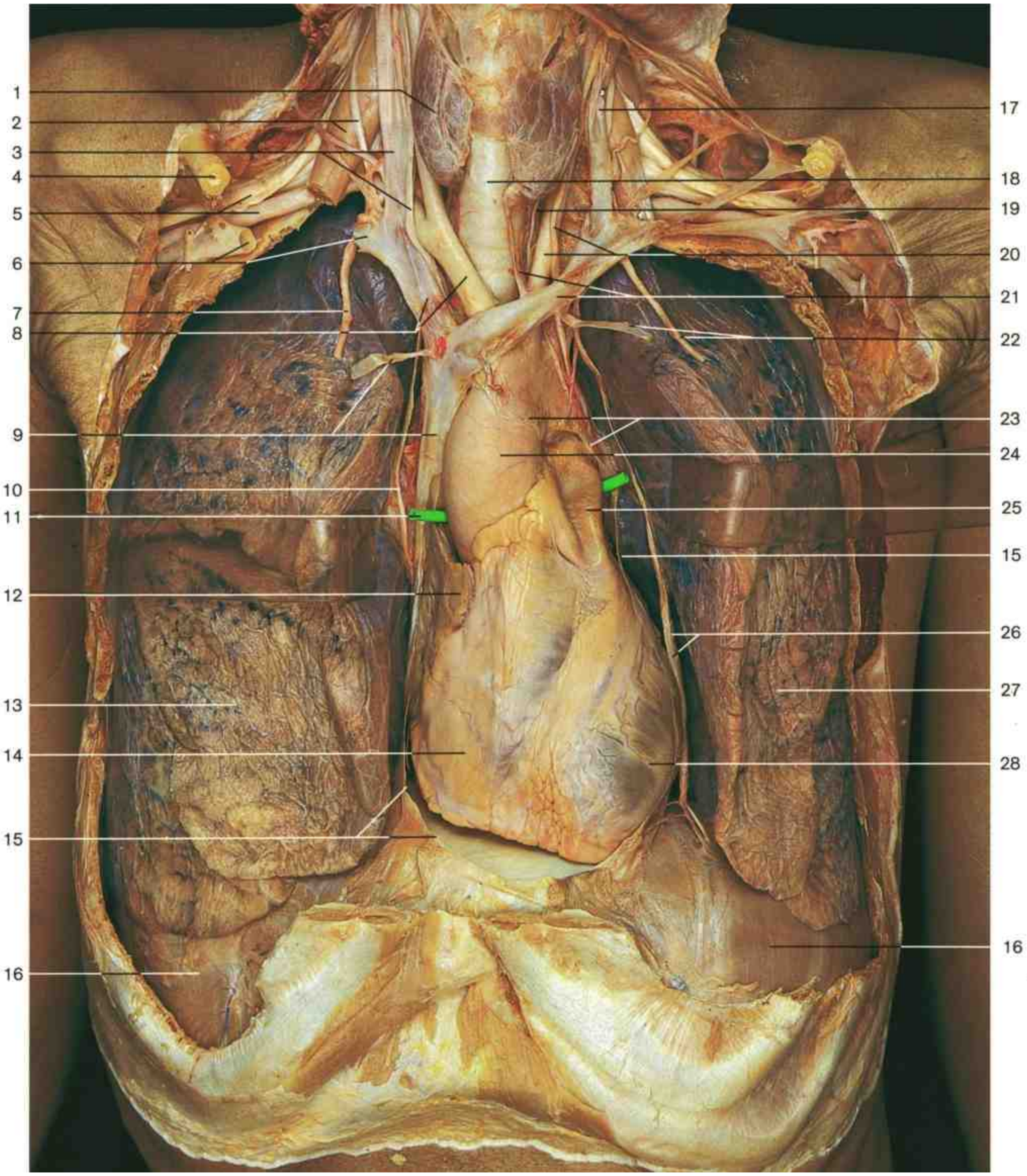
Thoracic organs (ventral aspect). The pleura has been opened and the lungs exposed. Remnants of the thymus and pericardium are seen.

1 Right internal jugular vein
2 Phrenic nerve and scalenus anterior muscle
3 Clavicle (divided)
4 Right subclavian artery and vein
5 Internal thoracic artery
6 Right brachiocephalic vein
7 Brachiocephalic trunk
8 Thymus (atrophic)
9 Upper lobe of right lung
10 Horizontal fissure of right lung (incomplete)
11 Middle lobe of right lung
12 Oblique fissure of right lung
13 Lower lobe of right lung
14 Xiphoid process
15 Diaphragm
16 Thyroid gland
17 Left internal jugular vein
18 Brachial plexus
19 Left cephalic vein
20 Left common carotid artery and vagus nerve
21 Left brachiocephalic vein
22 Internal thoracic artery and vein (divided)
23 Ascending aorta and aortic arch
24 Upper lobe of left lung
25 Pericardium
26 Oblique fissure of left lung
27 Lower lobe of left lung
28 Costal margin



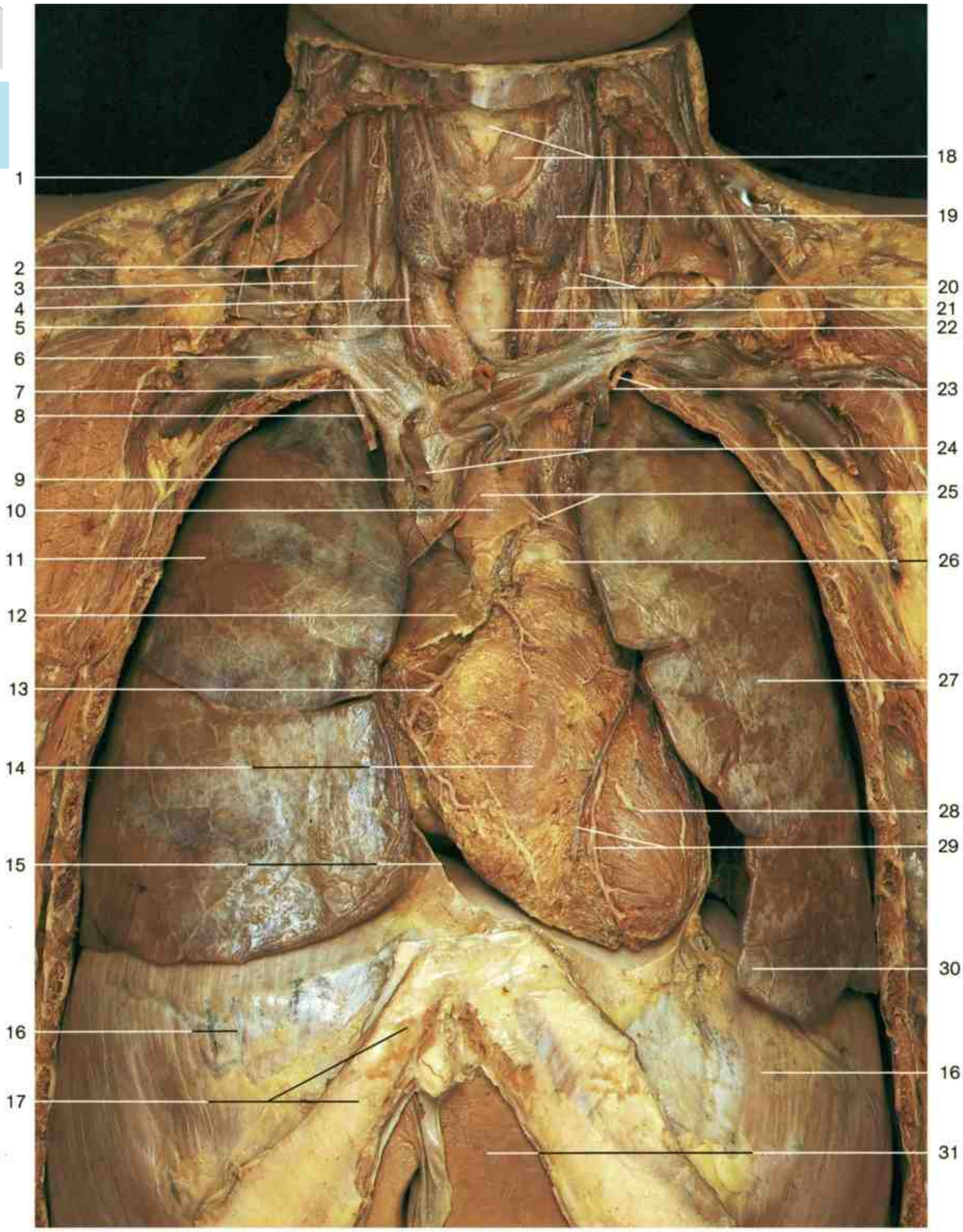
Thoracic organs (ventral aspect). The thoracic wall, costal pleura, pericardium, and diaphragm have been partly removed.

1 Internal jugular vein
2 External jugular vein (displaced medially)
3 Brachial plexus
4 Trachea
5 Right common carotid artery
6 Clavicle (divided)
7 Right brachiocephalic vein
8 Upper lobe of right lung
9 Thymus (atrophic)
10 Horizontal fissure of right lung
11 Middle lobe of right lung
12 Pericardium (cut edges)
13 Oblique fissure of lung
14 Lower lobe of right lung
15 Diaphragm
16 Falciform ligament
17 Liver
18 Location of larynx
19 Left internal jugular vein
20 Thyroid gland
21 Omohyoid muscle (divided)
22 Vagus nerve
23 Left subclavian vein
24 First rib (divided)
25 Internal thoracic artery and vein
26 Pectoralis major and pectoralis minor muscles (cut edges)
27 Upper lobe of left lung
28 Right ventricle
29 Cardiac notch of left lung
30 Interventricular sulcus of heart
31 Left ventricle
32 Lingula
33 Lower lobe of left lung



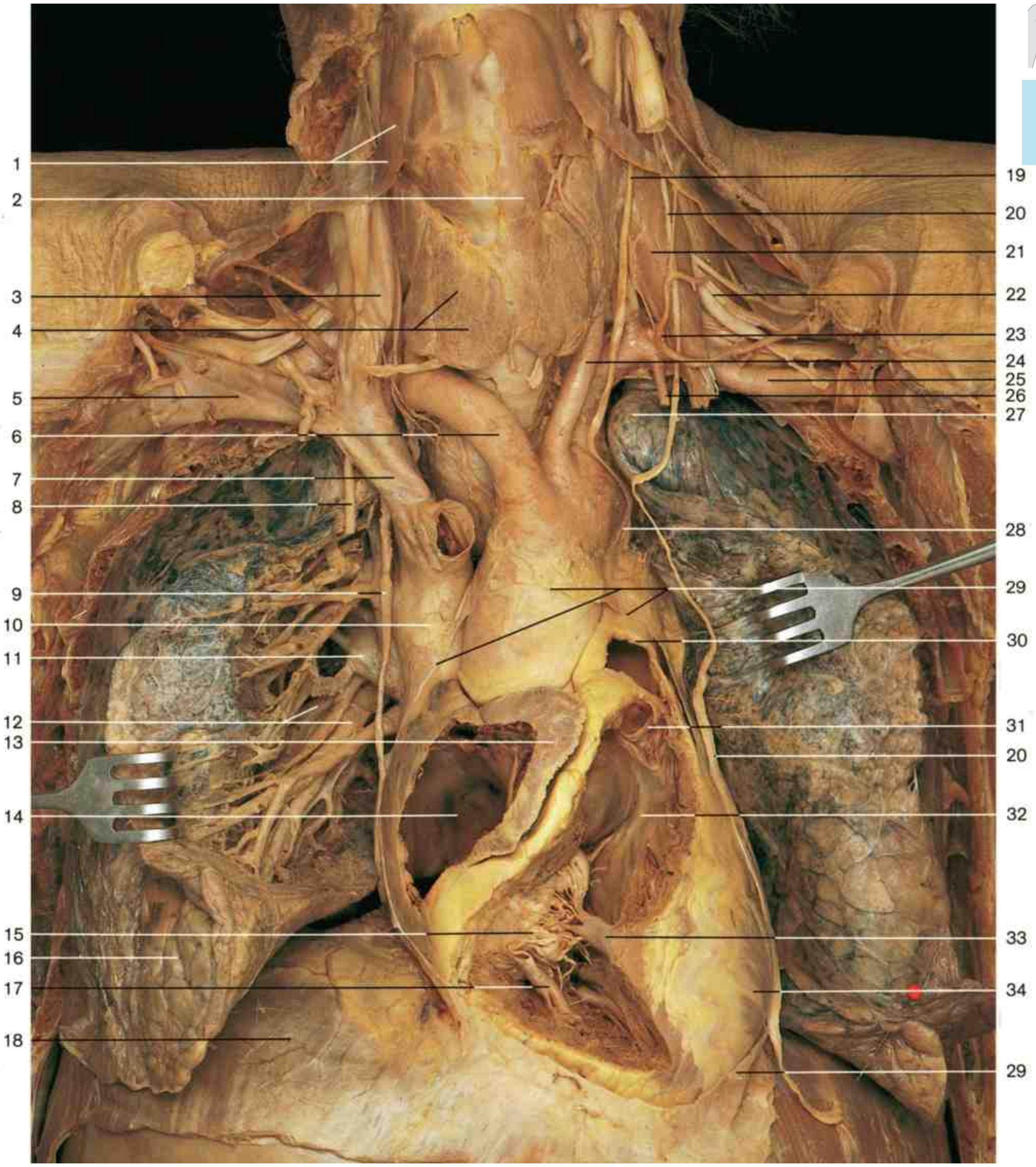
Thoracic organs (ventral aspect). Position of the heart and middle mediastinum. The anterior wall of the thorax, the costal pleura, and the pericardium have been removed and the lungs slightly reflected.

1 Thyroid gland
2 Phrenic nerve and scalenus anterior muscle
3 Vagus nerve and internal jugular vein
4 Clavicle (divided)
5 Brachial plexus and subclavian artery
6 Subclavian vein
7 Internal thoracic artery
8 Brachiocephalic trunk and right brachiocephalic vein
9 Superior vena cava and thymic vein
10 Right phrenic nerve
11 Transverse pericardial sinus (probe)
12 Right auricle
13 Middle lobe of right lung
14 Right ventricle
15 Cut edge of pericardium
16 Diaphragm
17 Internal jugular vein
18 Trachea
19 Left recurrent laryngeal nerve
20 Left common carotid artery and vagus nerve
21 Left brachiocephalic vein and inferior thyroid vein
22 Left internal thoracic artery and vein (divided)
23 Upper margin of pericardial sac
24 Ascending aorta
25 Pulmonary trunk
26 Left phrenic nerve and left pericardiacophrenic artery and vein
27 Upper lobe of left lung
28 Left ventricle



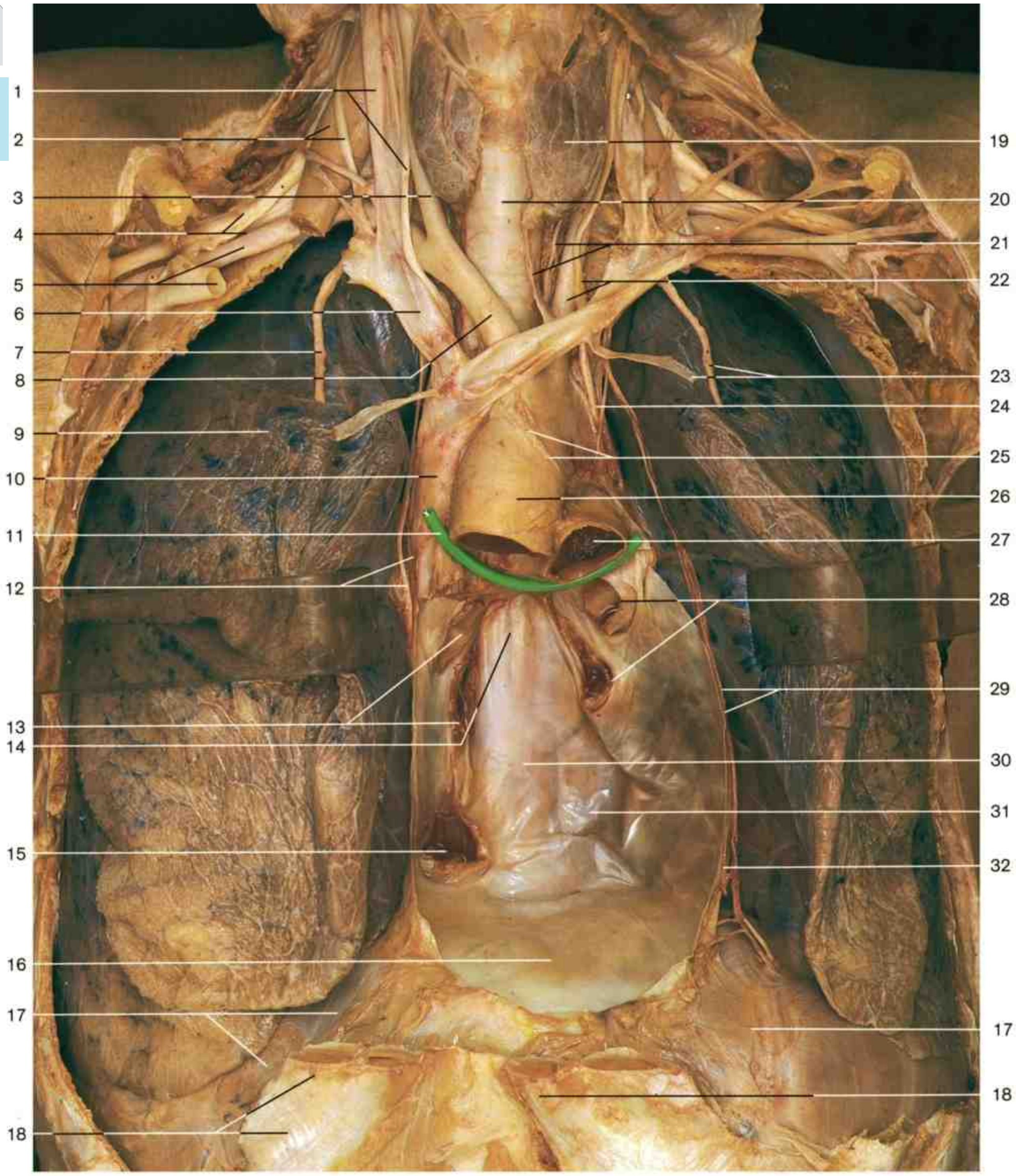
Thoracic organs (ventral aspect). Position of heart, dissection of coronary vessels in situ. The anterior wall of thorax, costal pleura, and pericardium have been removed.

1	Intermediate supraclavicular nerve	13	Right coronary artery and small cardiac vein	21	Left recurrent laryngeal nerve
2	Internal jugular vein	14	Right ventricle	22	Trachea
3	Right phrenic nerve	15	Cut edge of pericardium	23	Left internal thoracic artery and vein (divided)
4	Right vagus nerve	16	Diaphragm	24	Thymic veins
5	Right common carotid artery	17	Costal margin	25	Margin of pericardial sac
6	Right subclavian vein	18	Larynx (cricothyroid muscle and thyroid cartilage)	26	Pulmonary trunk
7	Right brachiocephalic vein	19	Thyroid gland	27	Left lung
8	Right internal thoracic artery	20	Left common carotid artery and left vagus nerve	28	Left ventricle
9	Superior vena cava			29	Anterior interventricular artery and vein
10	Ascending aorta			30	Lingula
11	Right lung			31	Liver
12	Right atrium				



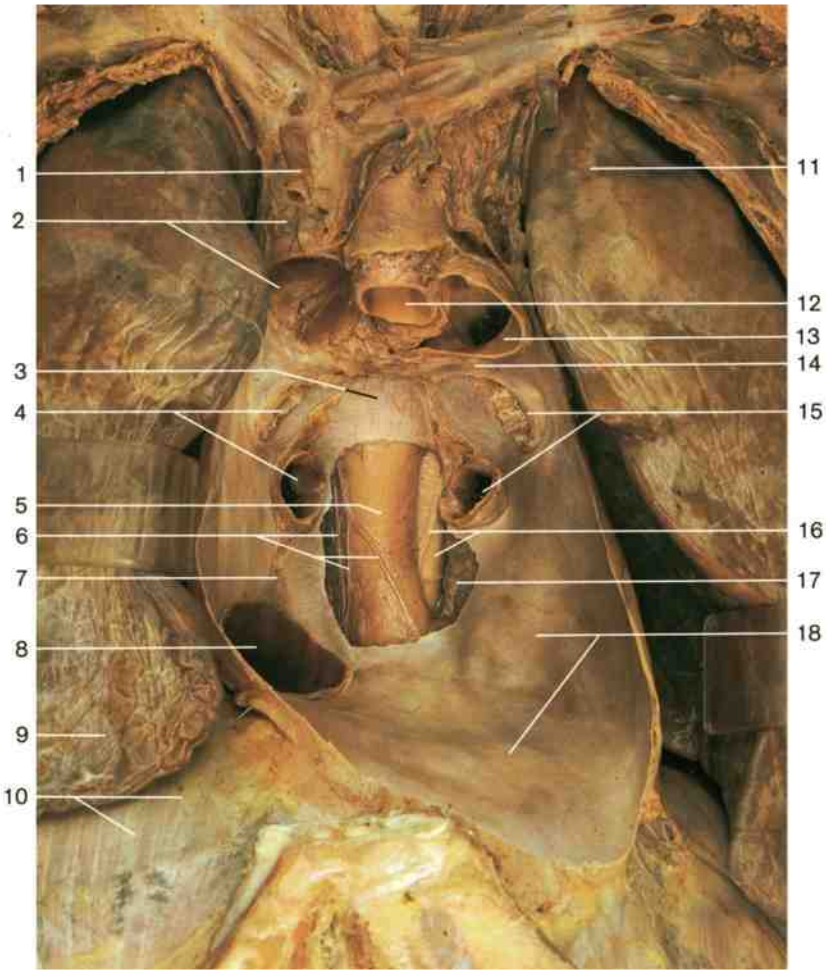
Thoracic organs (ventral aspect). Heart with valves in situ. Anterior wall of thorax, pleura, and anterior portion of pericardium have been removed. The right atrium and ventricle have been opened to show the right atrioventricular and pulmonary valves.

1	Omohyoid muscle	13	Right auricle	24	Left common carotid artery
2	Pyramidal lobe of thyroid gland	14	Right atrium	25	Left subclavian artery
3	Internal jugular vein	15	Right atrioventricular (tricuspid) valve	26	Left internal thoracic artery
4	Thyroid gland	16	Right lung	27	Apex of left lung
5	Right subclavian vein	17	Posterior papillary muscle	28	Left recurrent laryngeal nerve
6	Brachiocephalic trunk	18	Diaphragm	29	Cut edge of pericardium
7	Right brachiocephalic vein	19	Left vagus nerve	30	Pulmonary trunk (fenestrated)
8	Right internal thoracic artery	20	Left phrenic nerve	31	Pulmonic valve
9	Right phrenic nerve	21	Scalenus anterior muscle	32	Supraventricular crest
10	Superior vena cava	22	Brachial plexus	33	Anterior papillary muscle
11	Pulmonary vein	23	Thyrocervical trunk	34	Left ventricle
12	Branches of pulmonary artery				



Thoracic organs (ventral aspect). Pericardium and mediastinum. Anterior wall of thorax and heart have been removed and the lungs slightly reflected. Note probe within transverse pericardial sinus.

1 Right internal jugular vein and right vagus nerve
2 Right phrenic nerve and scalenus anterior muscle
3 Right common carotid artery
4 Brachial plexus
5 Right subclavian artery and vein
6 Right brachiocephalic vein
7 Right internal thoracic artery (divided)
8 Brachiocephalic trunk
9 Upper lobe of right lung
10 Superior vena cava
11 Transverse pericardial sinus (probe)
12 Right phrenic nerve and right pericardiacophrenic artery and vein
13 Right pulmonary veins
14 Oblique sinus of pericardium
15 Inferior vena cava
16 Diaphragmatic part of pericardium
17 Diaphragm
18 Costal margin
19 Thyroid gland
20 Trachea
21 Left recurrent laryngeal nerve and inferior thyroid vein
22 Left common carotid artery and left vagus nerve
23 Left internal thoracic artery and vein (divided)
24 Vagus nerve at aortic arch
25 Cut edge of pericardium
26 Ascending aorta
27 Pulmonary trunk (divided)
28 Left pulmonary veins
29 Left phrenic nerve and left pericardiacophrenic artery and vein
30 Contour of esophagus beneath pericardium
31 Contour of aorta beneath pericardium
32 Pericardium (cut edge)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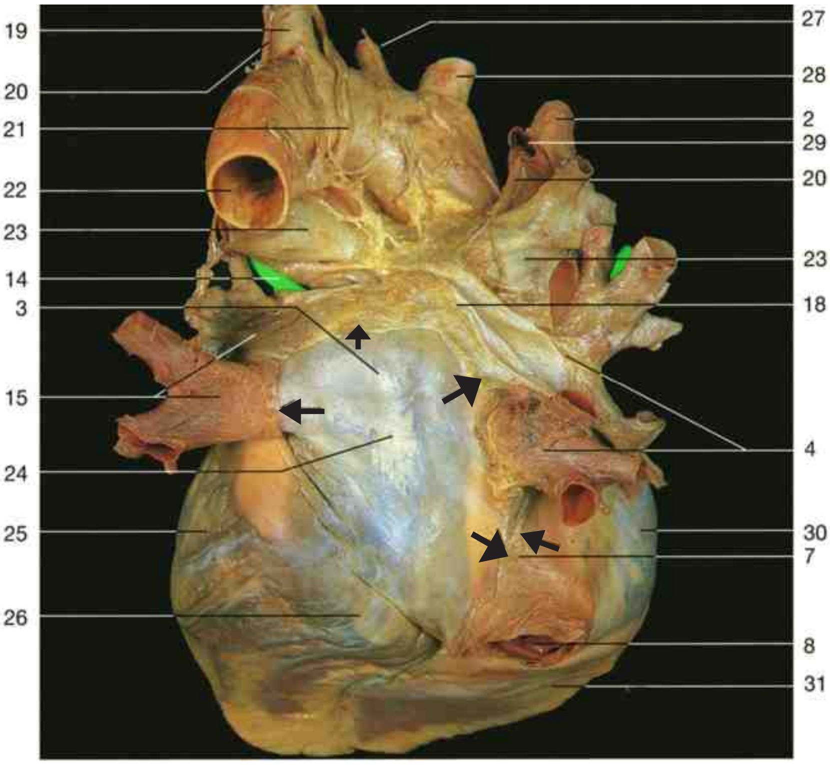
Pericardial sac (ventral aspect). The heart has been removed, and the posterior wall of the pericardium has been opened to show the adjacent esophagus and aorta.

1	Internal thoracic vein
2	Superior vena cava
3	Oblique sinus of pericardium
4	Right pulmonary veins
5	Esophagus
6	Branches of right vagus nerve
7	Mesocardium
8	Inferior vena cava
9	Middle lobe of right lung
10	Diaphragm
11	Upper lobe of left lung
12	Ascending aorta
13	Pulmonary trunk
14	Transverse pericardial sinus
15	Left pulmonary veins
16	Descending aorta and left vagus nerve
17	Left lung (adjacent to pericardium)
18	Pericardium
19	Left subclavian artery
20	Vagus nerve
21	Left recurrent laryngeal nerve
22	Descending aorta
23	Pulmonary artery
24	Left atrium
25	Left ventricle
26	Coronary sinus
27	Left common carotid artery
28	Brachiocephalic trunk
29	Azygos arch
30	Right atrium
31	Right ventricle
32	Aortic arch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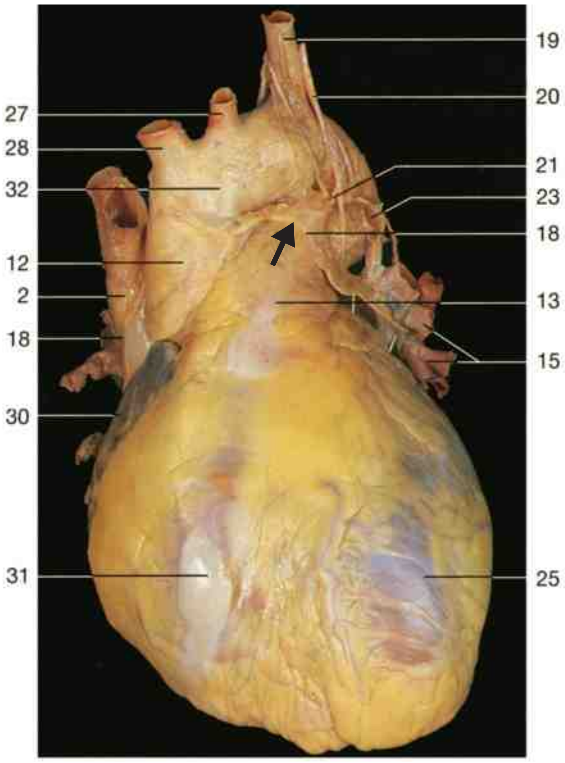
Heart with epicardium (posterior aspect). Arrows: oblique sinus.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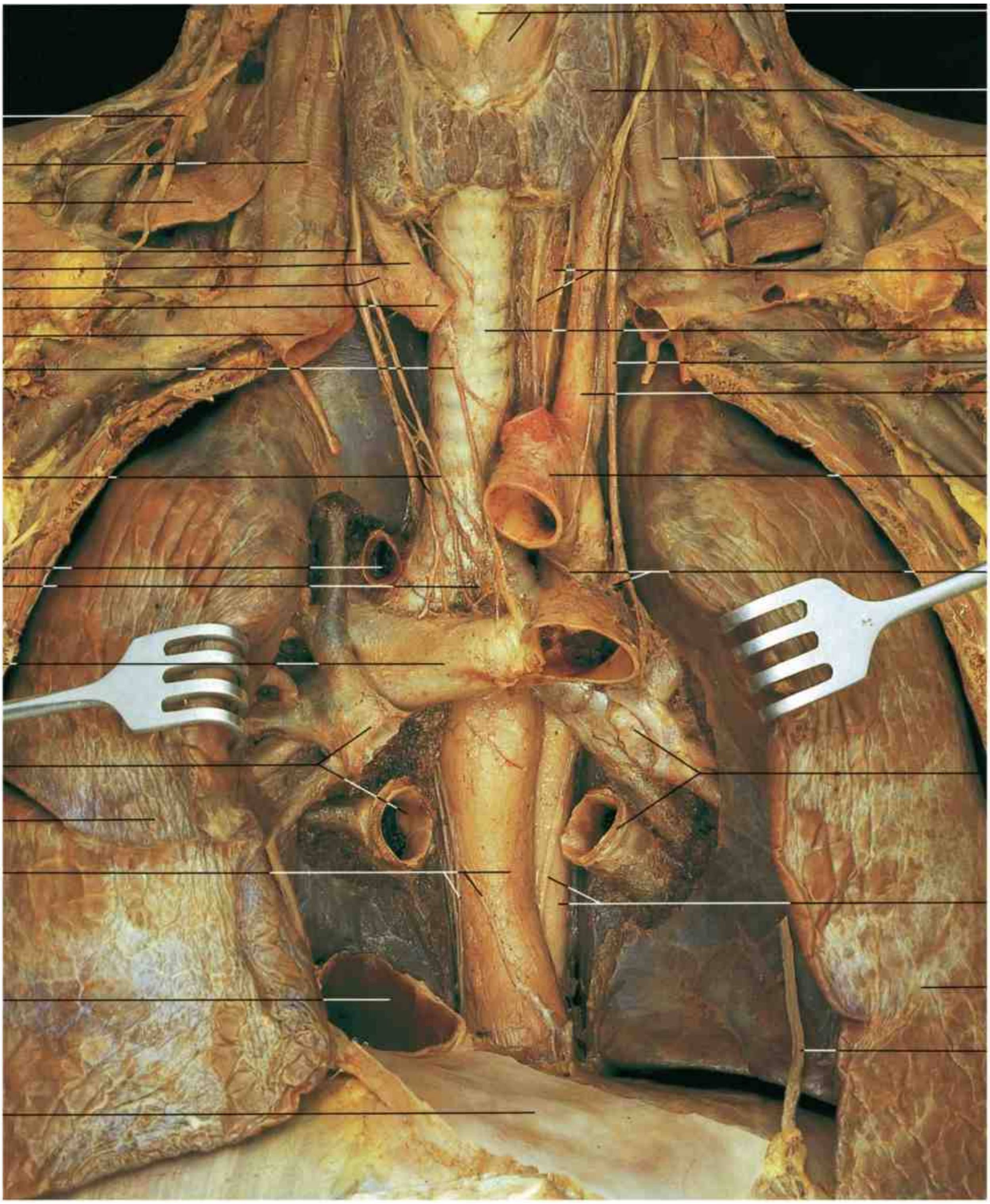
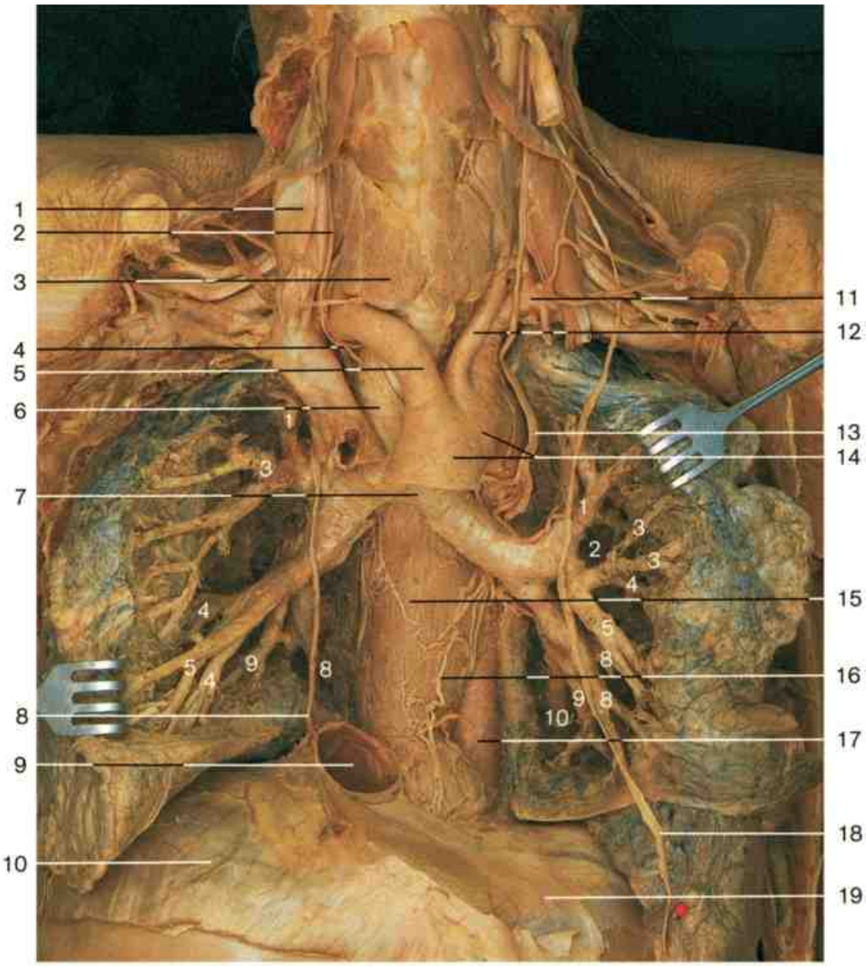
Heart with epicardium (anterior aspect). Arrow: pericardial reflection.



Mediastinal organs after removal of heart and pericardium (ventral aspect). Both lungs have been slightly reflected.

1	Supraclavicular nerves
2	Internal jugular vein
3	Omohyoid muscle
4	Right vagus nerve
5	Right common carotid artery
6	Right subclavian artery
7	Brachiocephalic trunk
8	Right brachiocephalic vein
9	Superior cervical cardiac branch of vagus nerve
10	Inferior cervical cardiac branches of vagus nerve
11	Azygos arch (divided)
12	Bifurcation of trachea
13	Right pulmonary artery
14	Right pulmonary veins
15	Right lung
16	Esophagus and branches of right vagus nerve
17	Inferior vena cava
18	Pericardium
19	Larynx (thyroid cartilage, cricothyroid muscle)
20	Thyroid gland
21	Internal jugular vein
22	Esophagus and left recurrent laryngeal nerve
23	Trachea
24	Left vagus nerve
25	Left common carotid artery
26	Aortic arch
27	Left recurrent laryngeal nerve branching off from vagus nerve
28	Left pulmonary veins
29	Thoracic aorta and left vagus nerve
30	Left lung
31	Left phrenic nerve (divided)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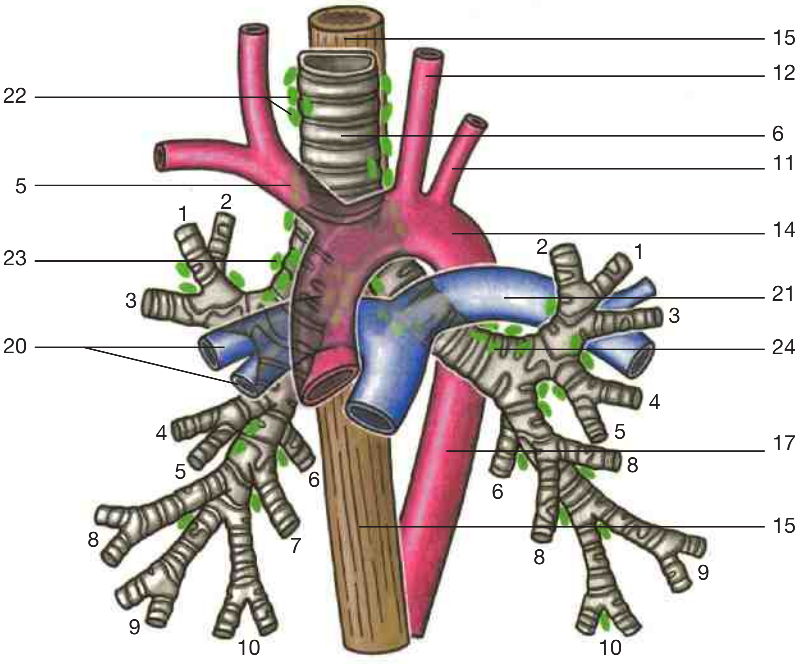
Bronchial tree in situ (ventral aspect). Heart and pericardium have been removed; the bronchi of the bronchopulmonary segments are dissected.
1–10 = numbers of segments (cf. p. 246 and 251).

1 Internal jugular vein
2 Right vagus nerve
3 Thyroid gland
4 Right recurrent laryngeal nerve
5 Brachiocephalic trunk
6 Trachea
7 Bifurcation of trachea
8 Right phrenic nerve
9 Inferior vena cava
10 Diaphragm
11 Left subclavian artery
12 Left common carotid artery
13 Left vagus nerve
14 Aortic arch
15 Esophagus
16 Esophageal plexus
17 Thoracic aorta
18 Left phrenic nerve
19 Pericardium at the central tendon of diaphragm
20 Right pulmonary artery
21 Left pulmonary artery
22 Tracheal lymph nodes
23 Superior tracheobronchial lymph nodes
24 Bronchopulmonary lymph nodes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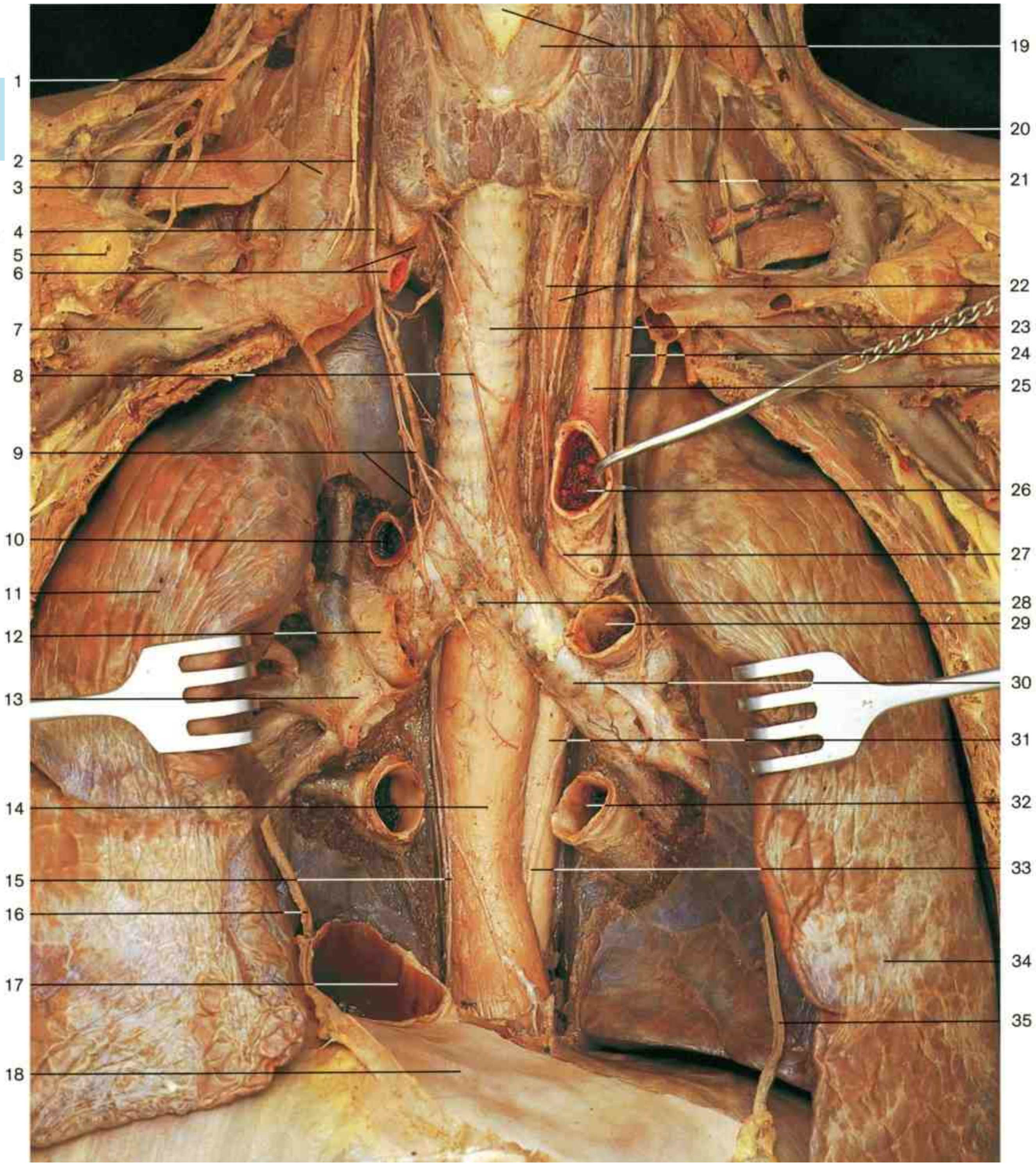
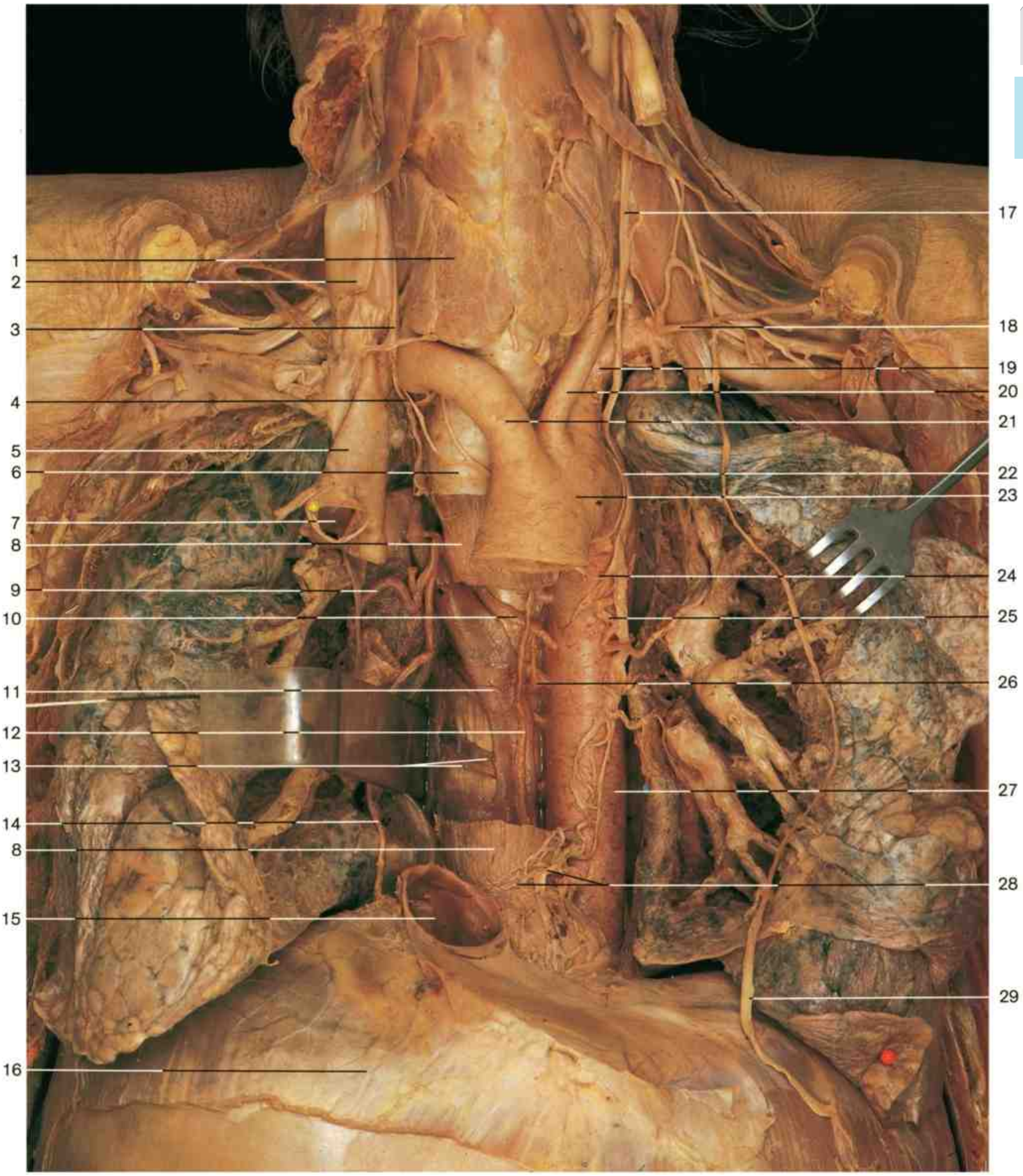
Relation of aorta, pulmonary trunk, and esophagus to trachea and bronchial tree (schematic drawing).
1–10 = numbers of segments (cf. p. 246 and 251).



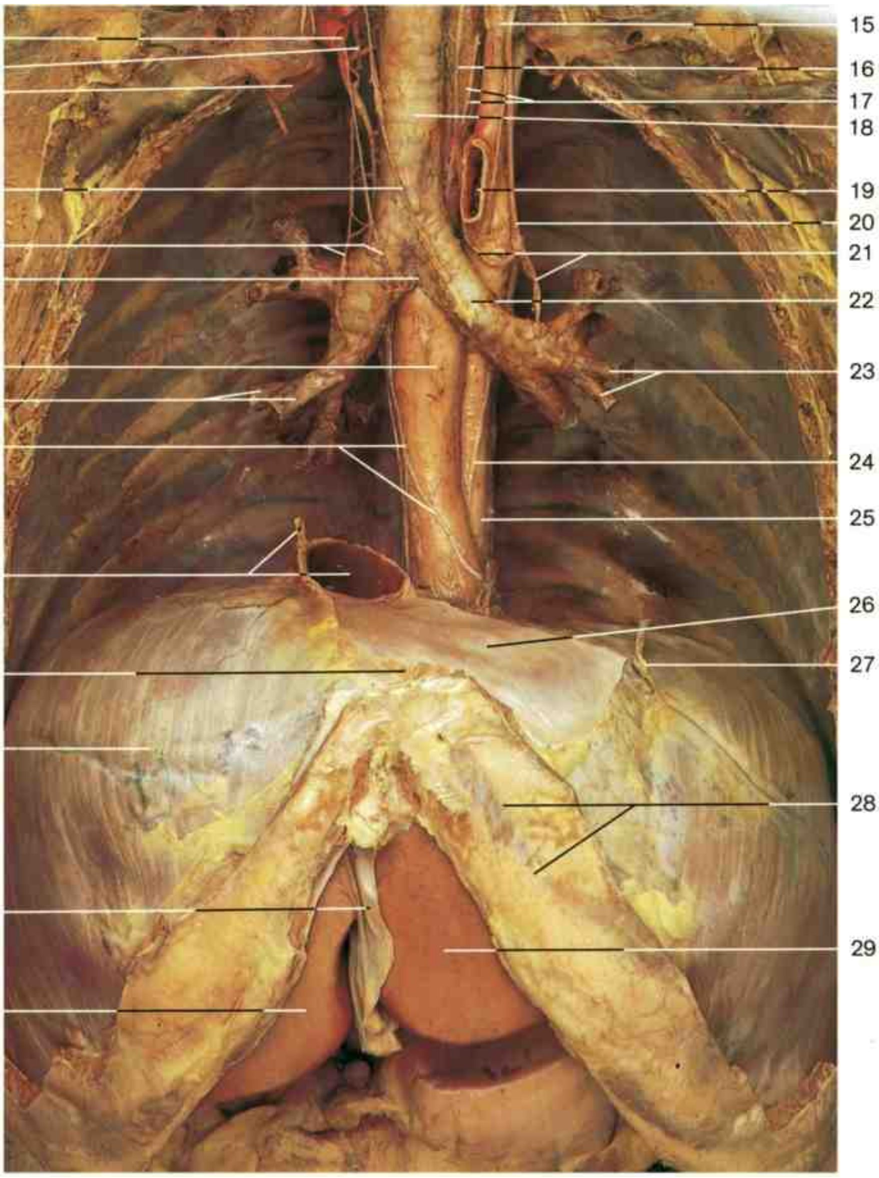
Mediastinal organs (ventral aspect). The heart with the pericardium has been removed, and the lungs and aortic arch have been slightly reflected to show the vagus nerves and their branches.

1 Supraclavicular nerves
2 Right internal jugular vein with ansa cervicalis
3 Omohyoid muscle
4 Right vagus nerve
5 Clavicle
6 Right subclavian artery and recurrent laryngeal nerve
7 Right subclavian vein
8 Superior cervical cardiac branch of vagus nerve
9 Inferior cervical cardiac branch of vagus nerve
10 Azygos arch (divided)
11 Right lung
12 Right pulmonary artery
13 Right pulmonary veins
14 Esophagus
15 Esophageal plexus
16 Right phrenic nerve (divided)
17 Inferior vena cava
18 Pericardium covering the diaphragm
19 Larynx (thyroid cartilage and cricothyroid muscle)
20 Thyroid gland
21 Left internal jugular vein
22 Esophagus and left recurrent laryngeal nerve
23 Trachea
24 Left vagus nerve
25 Left common carotid artery
26 Aortic arch
27 Left recurrent laryngeal nerve
28 Bifurcation of trachea
29 Left pulmonary artery
30 Left primary bronchus
31 Descending aorta
32 Left pulmonary veins
33 Branch of left vagus nerve
34 Left lung
35 Left phrenic nerve (divided)

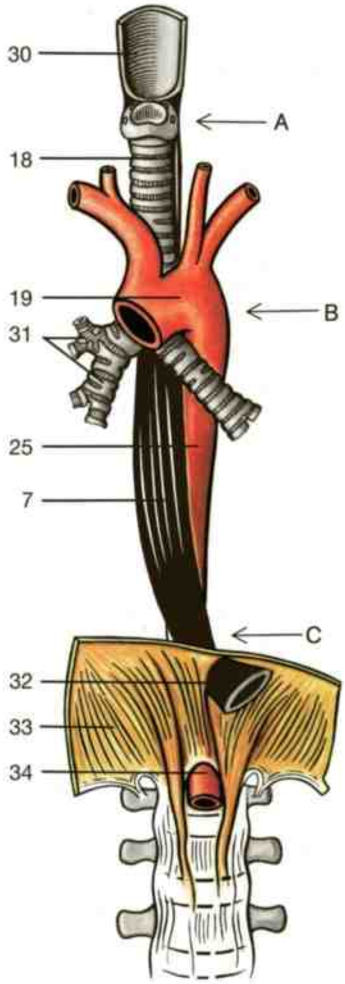


Mediastinal organs (ventral aspect). Heart and distal part of esophagus have been removed to display the vessels and nerves of the posterior mediastinum.

1	Thyroid gland	11	Azygos vein	21	Brachiocephalic trunk
2	Right internal jugular vein	12	Thoracic duct	22	Left vagus nerve
3	Right vagus nerve	13	Posterior intercostal artery and vein (in front of the vertebral column)	23	Aortic arch
4	Point where right recurrent laryngeal nerve is branching off the vagus nerve	14	Right phrenic nerve	24	Left recurrent laryngeal nerve
5	Right brachiocephalic vein	15	Inferior vena cava	25	Left bronchial artery
6	Trachea	16	Diaphragm	26	Lymph node
7	Left brachiocephalic vein (reflected)	17	Left vagus nerve	27	Thoracic aorta
8	Esophagus	18	Thyrocervical trunk	28	Esophageal plexus
9	Right bronchial artery	19	Left subclavian artery	29	Left phrenic nerve
10	Posterior intercostal artery	20	Left common carotid artery		



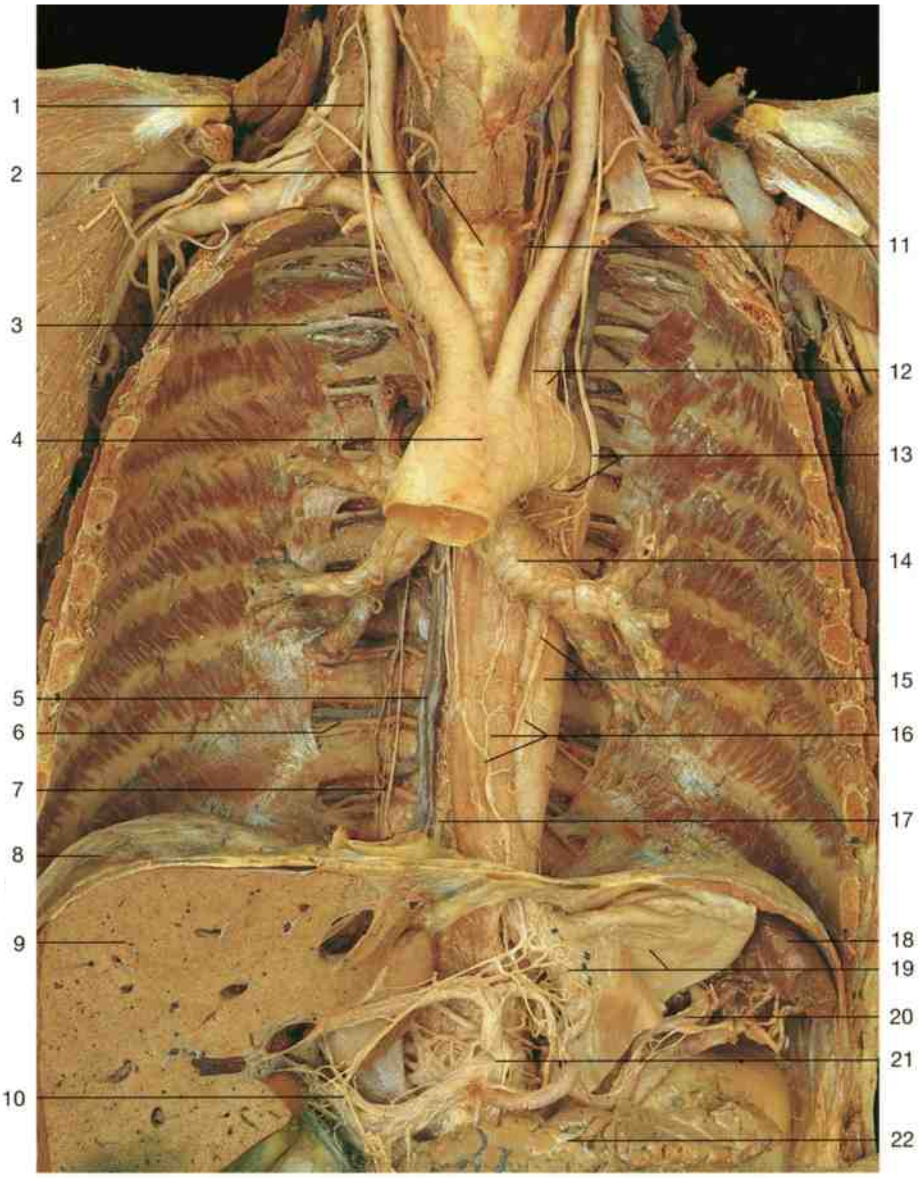
Diaphragm and organs of mediastinum (anterior aspect). Heart and lungs have been removed; the costal margin remains in place. Note the different courses of left and right vagus.



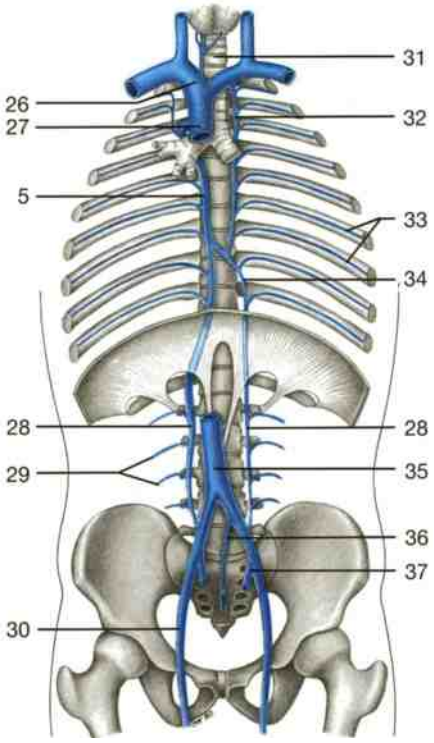
Organs of posterior mediastinum (ventral aspect, schematic drawing). Three regions in which the esophagus is narrowed are shown:

A = termed upper sphincter (at the level of the cricoid cartilage);
B = termed middle sphincter (at the level of the aortic arch);
C = termed lower sphincter (at the level of the diaphragm).

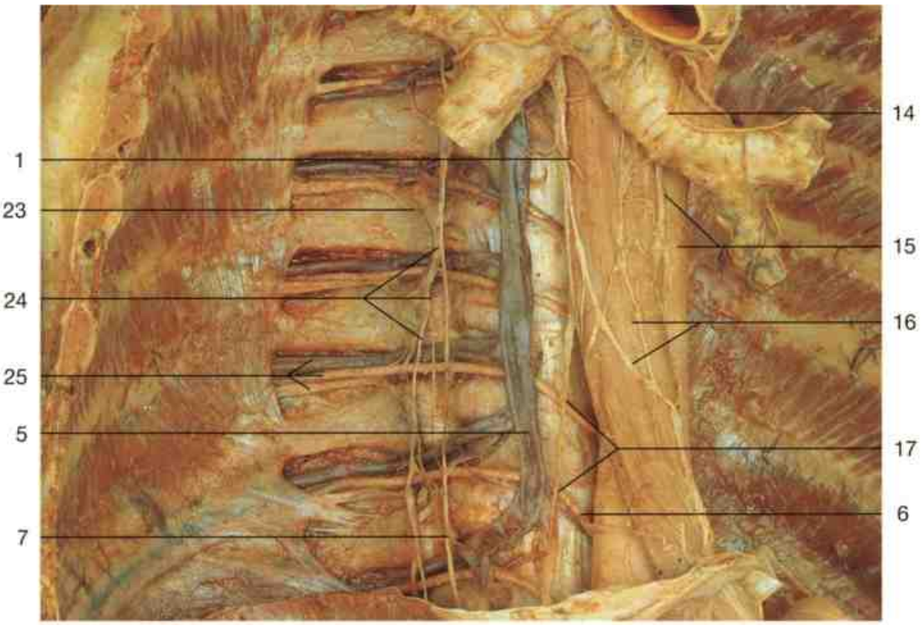
1 Right subclavian artery
2 Right recurrent laryngeal nerve
3 Right brachiocephalic vein
4 Superior cervical cardiac nerve
5 Inferior cervical cardiac nerves and pulmonary branches
6 Bifurcation of trachea
7 Esophagus (thoracic part)
8 Bronchi of lateral and medial segments of middle lobe
9 Esophageal plexus and branches of right vagus nerve
10 Inferior vena cava and right phrenic nerve (cut)
11 Sternal part of diaphragm
12 Costal part of diaphragm
13 Falciform ligament of liver
14 Liver (quadrate lobe)
15 Left common carotid artery
16 Left recurrent laryngeal nerve
17 Esophageal branches of left vagus nerve and esophagus
18 Trachea
19 Aortic arch
20 Left vagus nerve
21 Left recurrent laryngeal nerve with inferior cardiac nerve
22 Left primary bronchus
23 Superior and inferior lingular bronchi
24 Esophageal plexus of left vagus nerve
25 Descending aorta
26 Central tendon of diaphragm covered with pericardium
27 Left phrenic nerve (divided)
28 Costal margin
29 Liver, left lobe
30 Pharynx
31 Secondary bronchi
32 Esophagus (abdominal part)
33 Diaphragm
34 Abdominal aorta



Organs of posterior mediastinum (anterior aspect).

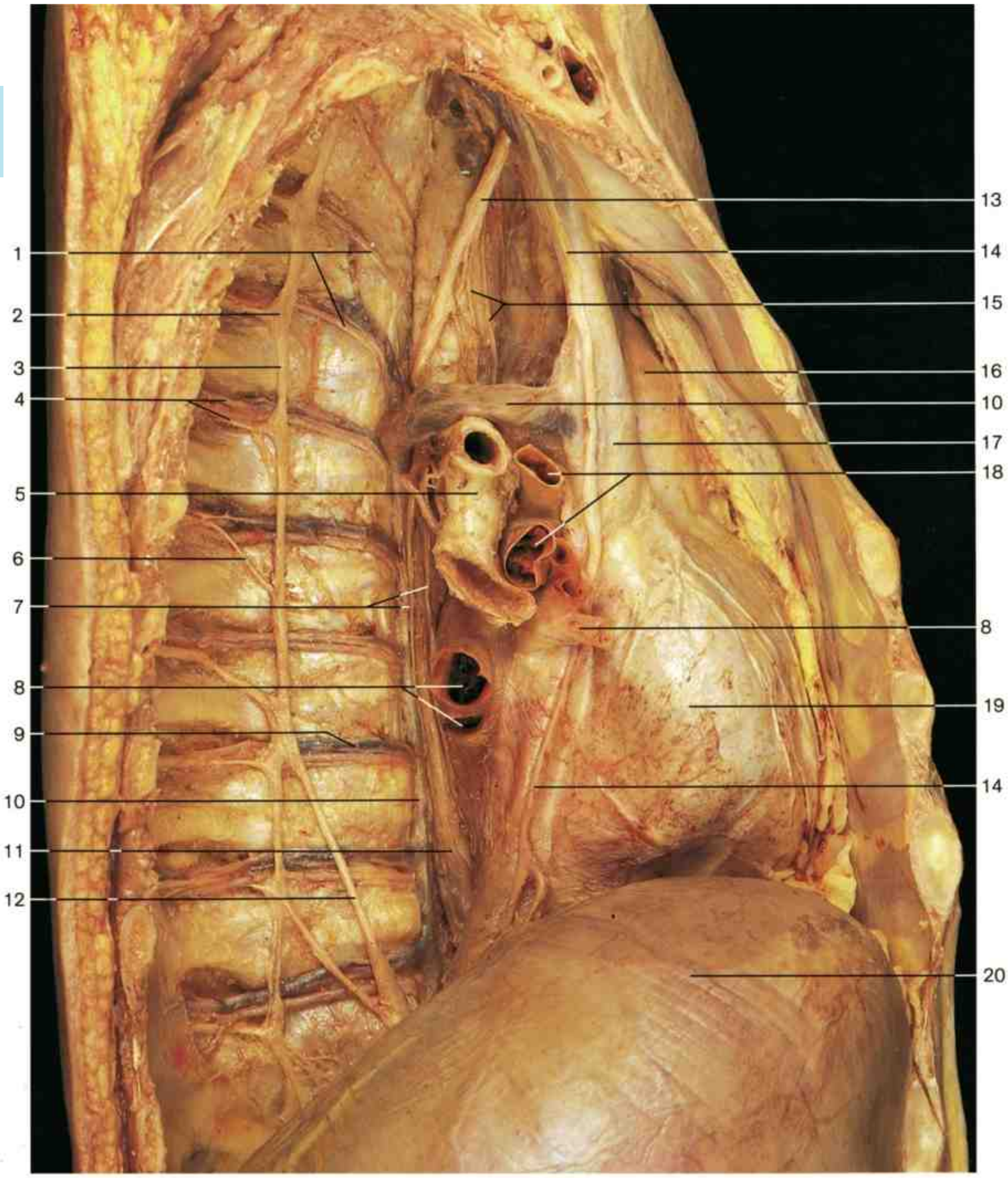


Veins of the posterior wall of thoracic and abdominal cavity (schematic drawing).



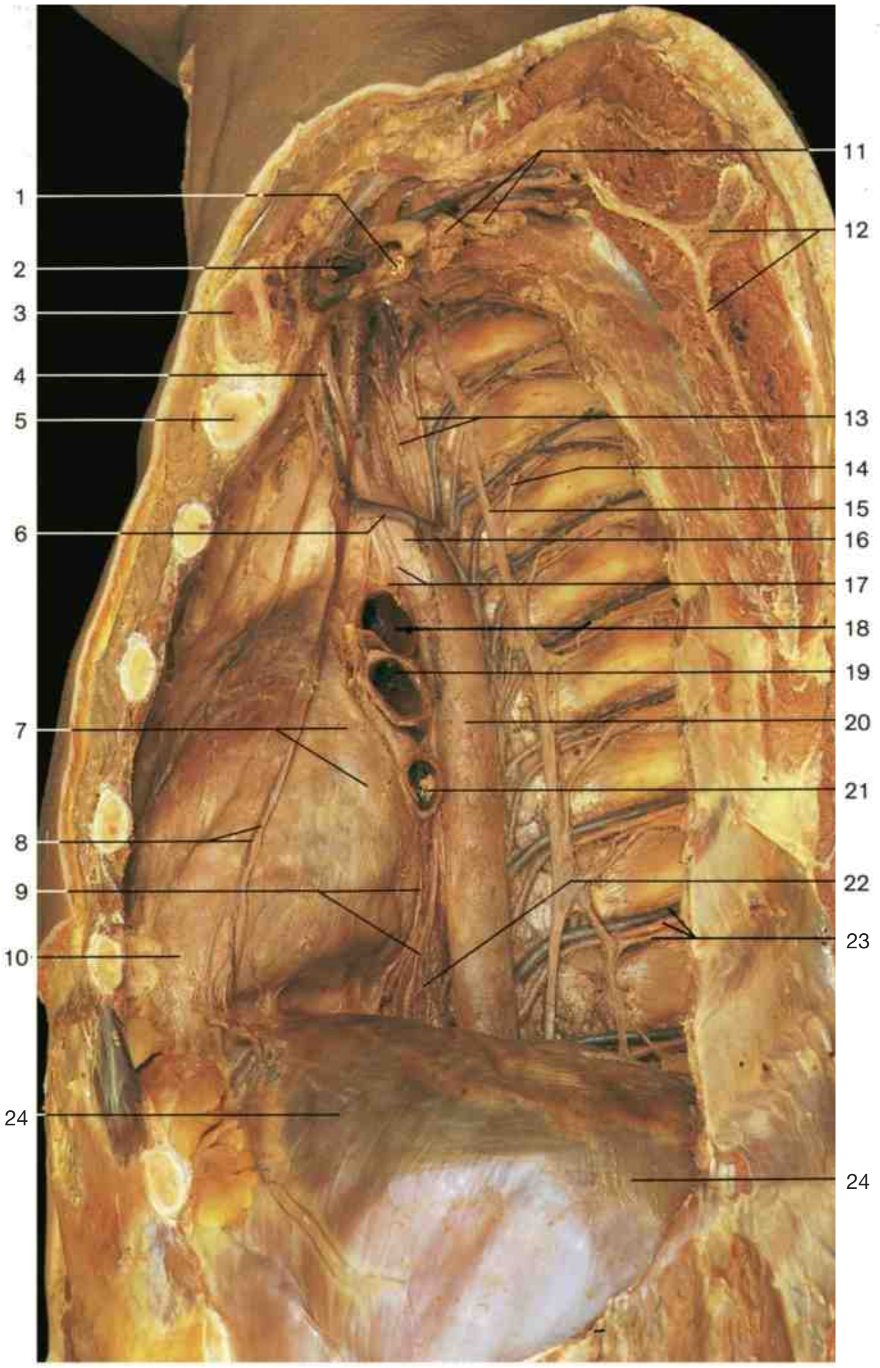
Inferior segment of posterior mediastinum (anterior aspect).

1	Right vagus nerve
2	Thyroid gland and trachea
3	Intercostal nerve
4	Aortic arch
5	Azygos vein
6	Posterior intercostal artery
7	Greater splanchnic nerve
8	Diaphragm
9	Liver
10	Proper hepatic artery and hepatic plexus
11	Left recurrent laryngeal nerve
12	Inferior cervical cardiac nerves
13	Left vagus nerve and left recurrent laryngeal nerve
14	Left primary bronchus
15	Thoracic aorta and left vagus nerve
16	Esophagus and esophageal plexus
17	Thoracic duct
18	Spleen
19	Anterior gastric plexus and stomach (divided)
20	Splenic artery and splenic plexus
21	Celiac trunk and celiac plexus
22	Pancreas
23	Ramus communicans
24	Sympathetic trunk and sympathetic ganglion
25	Posterior intercostal vein and artery and intercostal nerve
26	Right brachiocephalic vein
27	Superior vena cava
28	Ascending lumbar vein
29	Lumbar veins
30	Right external iliac vein
31	Trachea
32	Accessory hemiazygos vein
33	Posterior intercostal veins
34	Hemiazygos vein
35	Inferior vena cava
36	Median sacral vein
37	Internal iliac vein

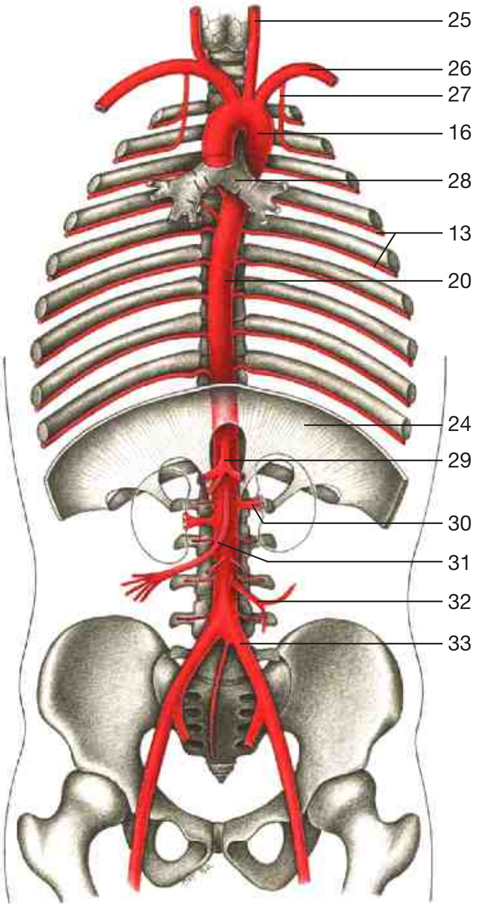


Mediastinal organs (right lateral aspect). Right lung and pleura of right half of the thorax have been removed.

1 Posterior intercostal arteries
2 Ganglion of sympathetic trunk
3 Sympathetic trunk
4 Vessels and nerves of the intercostal space (from above: posterior intercostal vein and artery and intercostal nerve)
5 Right primary bronchus
6 Ramus communicans of sympathetic trunk
7 Esophageal plexus (branches of right vagus nerve)
8 Pulmonary veins
9 Posterior intercostal vein
10 Azygos vein
11 Esophagus
12 Greater splanchnic nerve
13 Right vagus nerve
14 Right phrenic nerve
15 Inferior cervical cardiac branches of vagus nerve
16 Aortic arch
17 Superior vena cava
18 Right pulmonary artery
19 Heart with pericardium
20 Diaphragm

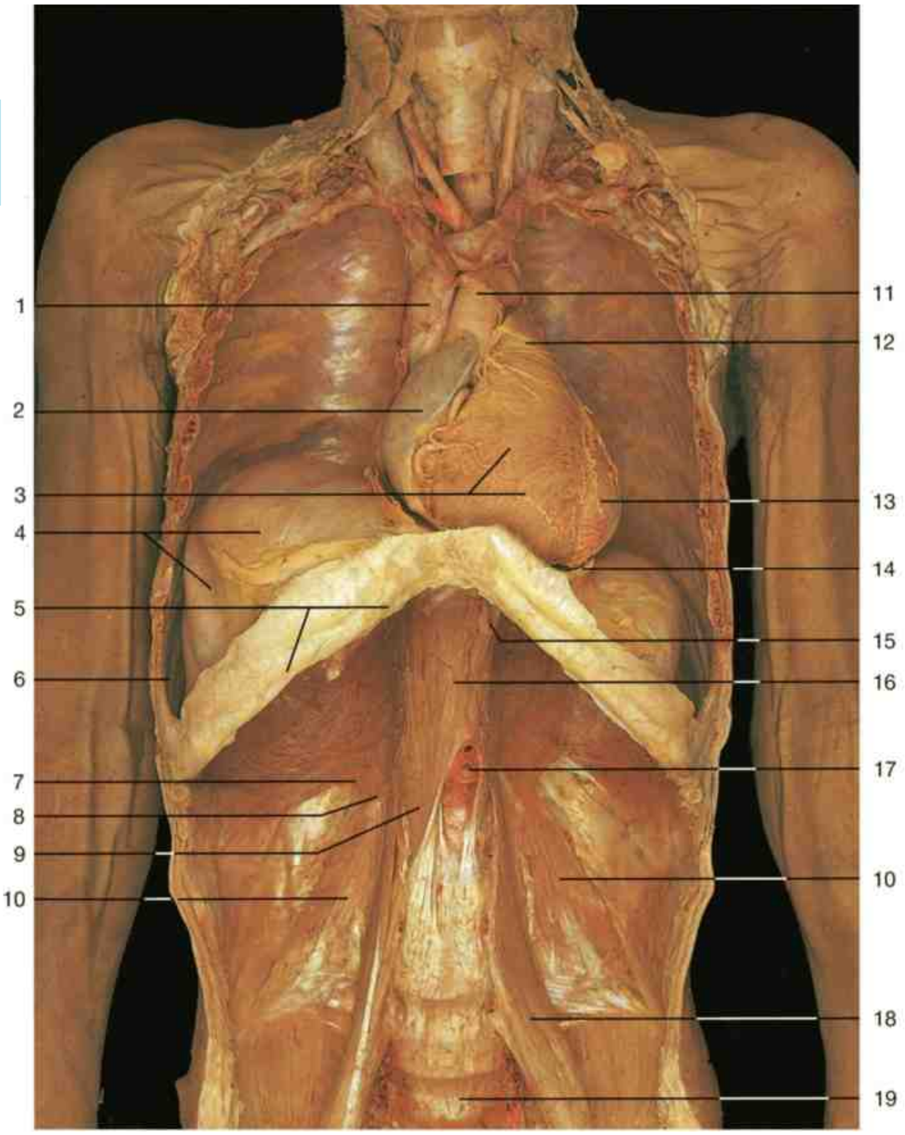


Organs of posterior and superior mediastinum (left lateral aspect).



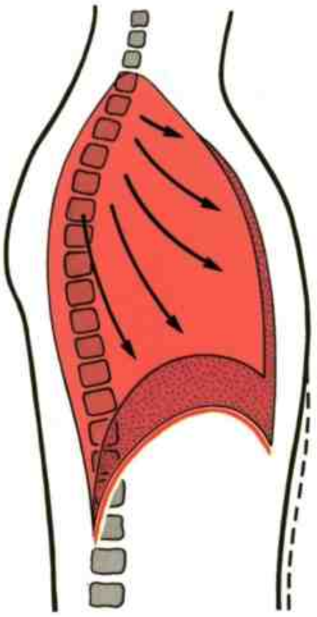
Main branches of descending aorta (schematic drawing).

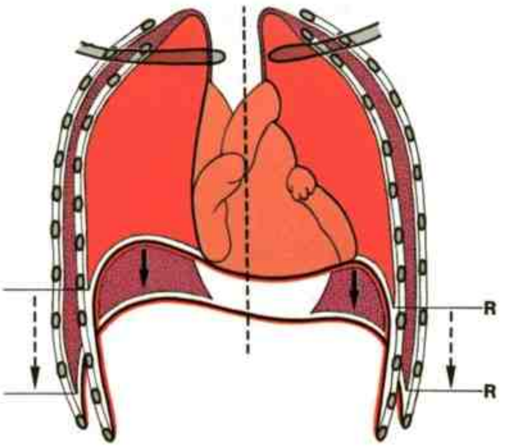
1 Subclavian artery
2 Subclavian vein
3 Clavicle (divided)
4 Left vagus nerve
5 First rib (divided)
6 Left superior intercostal vein
7 Left atrium with pericardium
8 Left phrenic nerve and pericardiacophrenic artery and vein
9 Esophageal plexus (branches derived from left vagus nerve)
10 Apex of heart with pericardium
11 Brachial plexus
12 Scapula (divided)
13 Posterior intercostal arteries
14 White ramus communicans of sympathetic trunk
15 Sympathetic trunk
16 Aortic arch
17 Left vagus nerve and left recurrent laryngeal nerve
18 Left pulmonary artery
19 Left primary bronchus
20 Thoracic aorta
21 Pulmonary vein
22 Esophagus (thoracic part)
23 Posterior intercostal artery and vein and intercostal nerve
24 Diaphragm
25 Common carotid artery
26 Subclavian artery
27 Highest intercostal artery
28 Bifurcation of trachea
29 Celiac trunk
30 Renal artery
31 Superior mesenteric artery
32 Inferior mesenteric artery
33 Common iliac artery



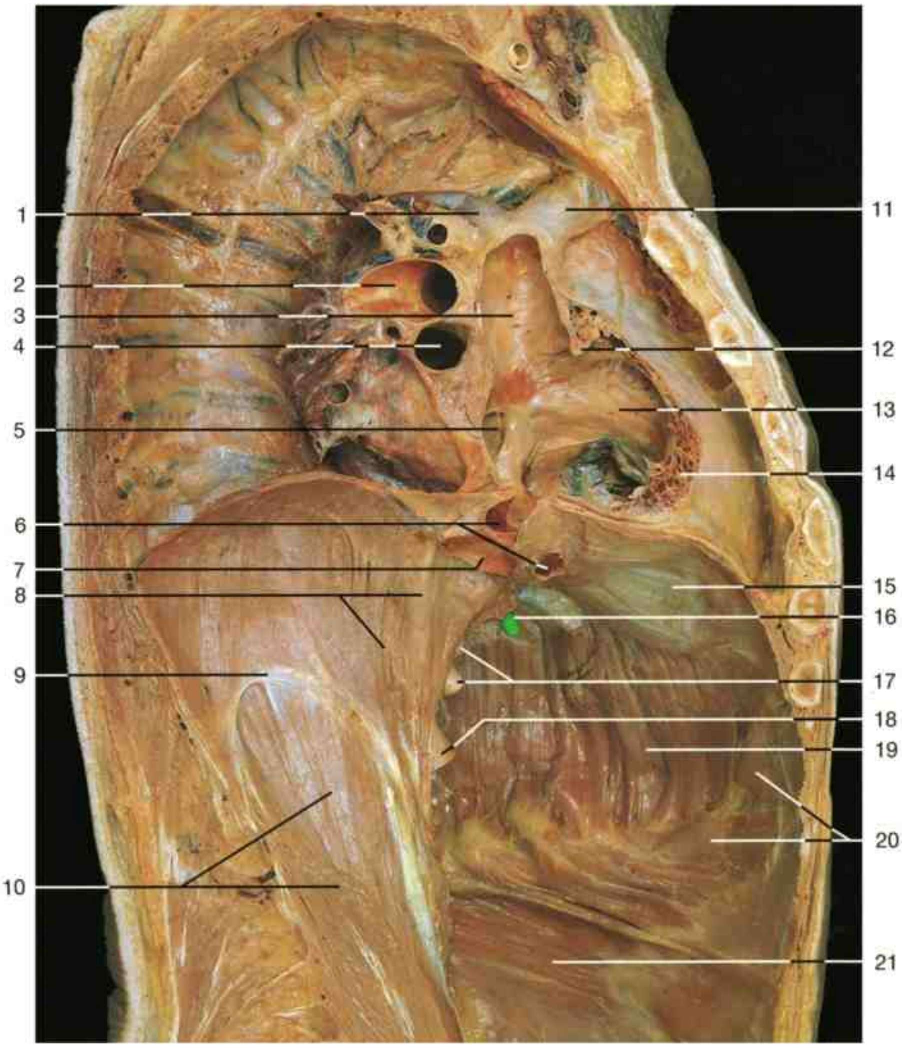
1 Superior vena cava
2 Right atrium
3 Right ventricle
4 Costal part of diaphragm
5 Costal margin
6 Position of costodiaphragmatic recess
7 Lateral arcuate ligament
8 Medial arcuate ligament
9 Right crus of lumbar part of diaphragm
10 Quadratus lumborum muscle
11 Ascending aorta
12 Pulmonary trunk
13 Left ventricle
14 Pericardium, diaphragm
15 Esophageal hiatus and abdominal part of esophagus (cut)
16 Lumbar part of diaphragm
17 Aortic hiatus
18 Psoas major muscle
19 Lumbar vertebra

Diaphragm in situ (anterior aspect). Anterior walls of thoracic and abdominal cavities have been removed. Natural position of the heart above the central tendon on the diaphragm is shown.



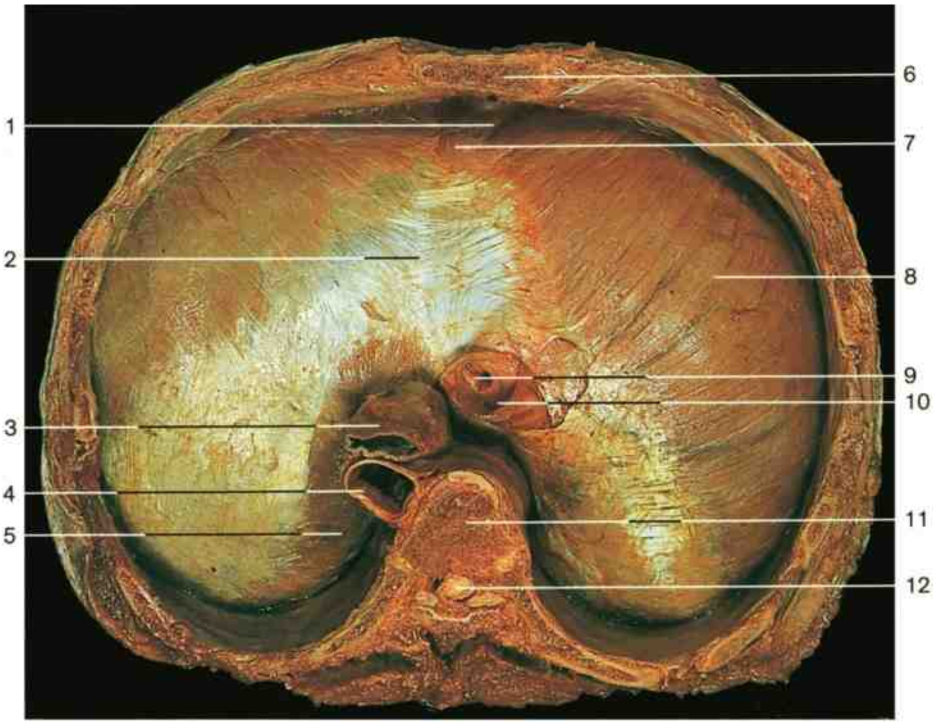


Changes in the position of the diaphragm and thoracic cage during respiration. Left: lateral aspect; right: anterior aspect. During inspiration the diaphragm moves downwards and the lower part of the thoracic cage expands forward and laterally, causing the costodiaphragmatic recess (R) to enlarge (cf. dotted arrows).



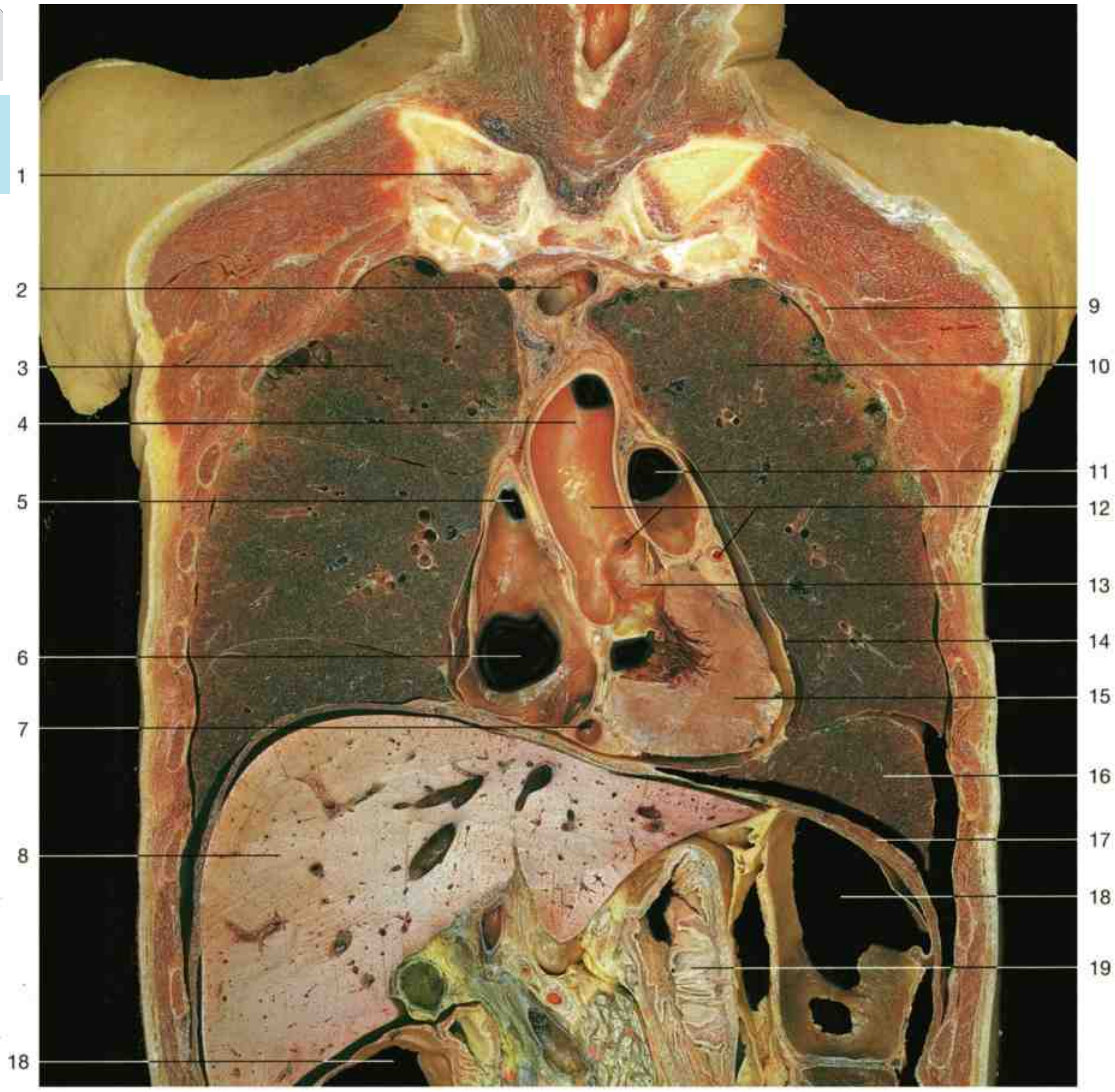
Diaphragm. Paramedian section to the right of the median plane through thoracic and upper abdominal cavities. The plane passes through the superior and inferior vena cava just to the right of the vertebral bodies. Most of the heart remains in situ to the left of this plane (viewed from the right side).

1 Azygos venous arch
2 Right pulmonary artery
3 Superior vena cava
4 Right pulmonary vein
5 Fossa ovalis
6 Hepatic veins
7 Inferior vena cava
8 Right crus of lumbar part of diaphragm
9 Medial arcuate ligament
10 Psoas major muscle
11 Left brachiocephalic vein
12 Terminal crista
13 Right atrium
14 Right auricle
15 Central tendon of diaphragm
16 Esophagus
17 Celiac trunk and superior mesenteric artery
18 Aorta
19 Costal part of diaphragm
20 Costal margin
21 Transversus abdominis muscle

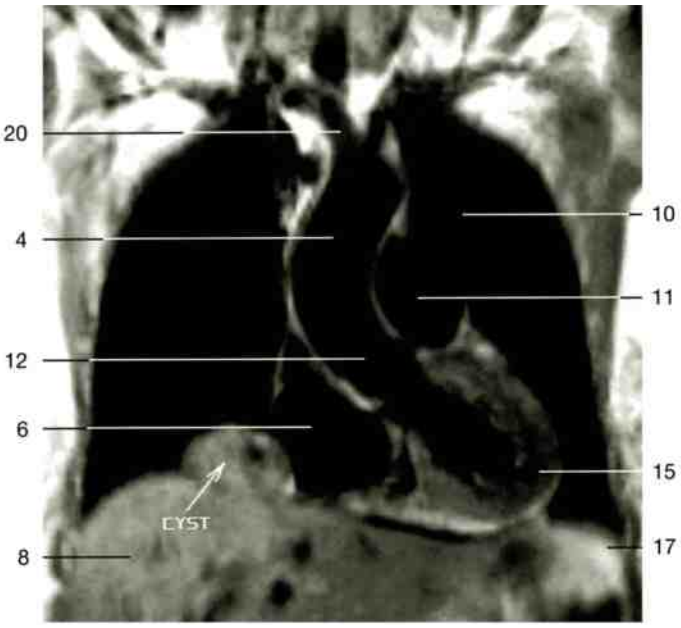


Diaphragm (superior aspect). The pleura and pericardium have been removed.

1 Sternocostal triangle
2 Central tendon (from above)
3 Esophagus
4 Aorta
5 Lumbar part of diaphragm
6 Sternum
7 Sternal part of diaphragm
8 Costal part of diaphragm
9 Entrance of hepatic veins
10 Inferior vena cava
11 Body of 9th thoracic vertebra
12 Spinal cord

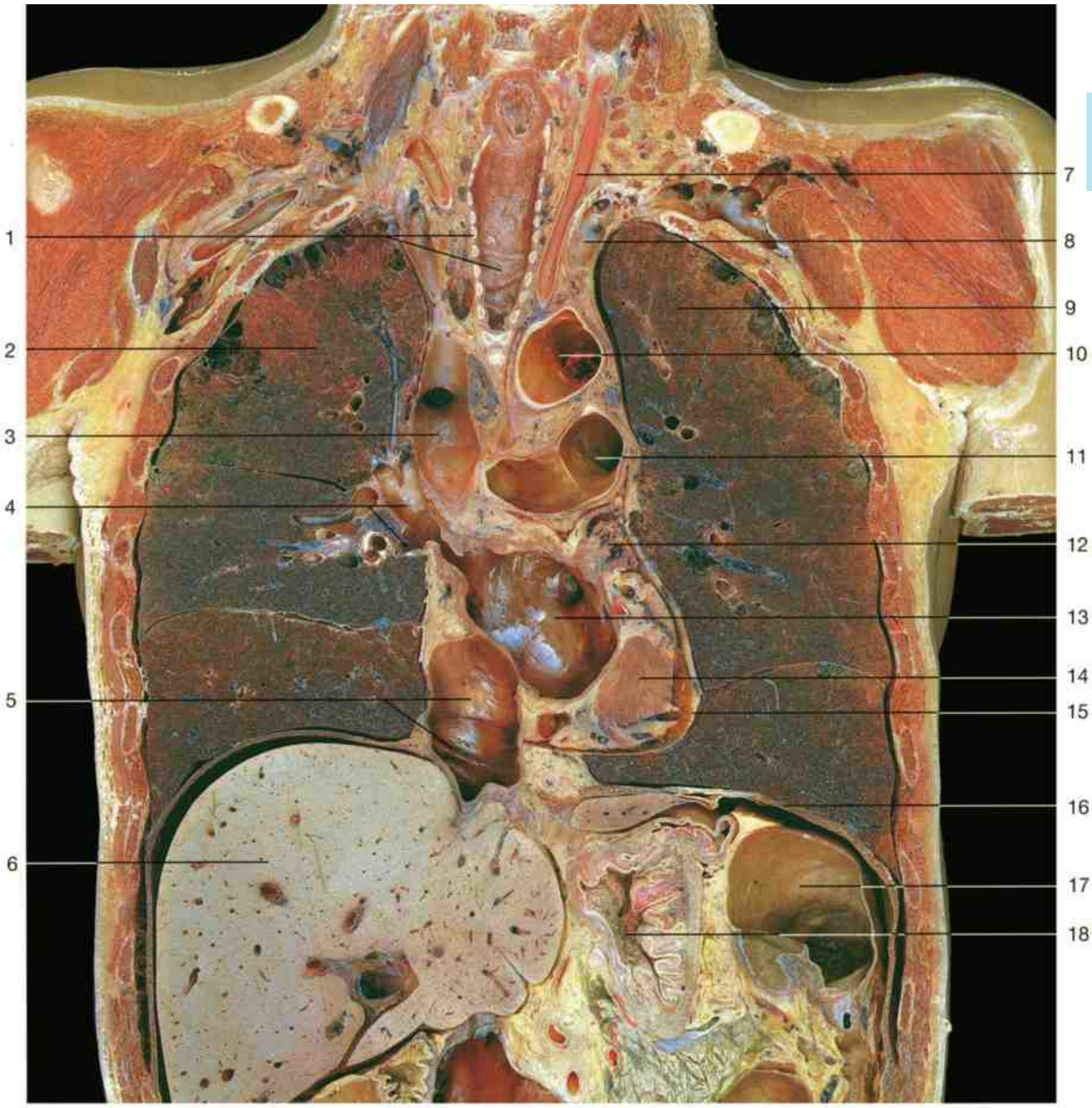


Coronal section through the thorax at the level of ascending aorta (anterior aspect).

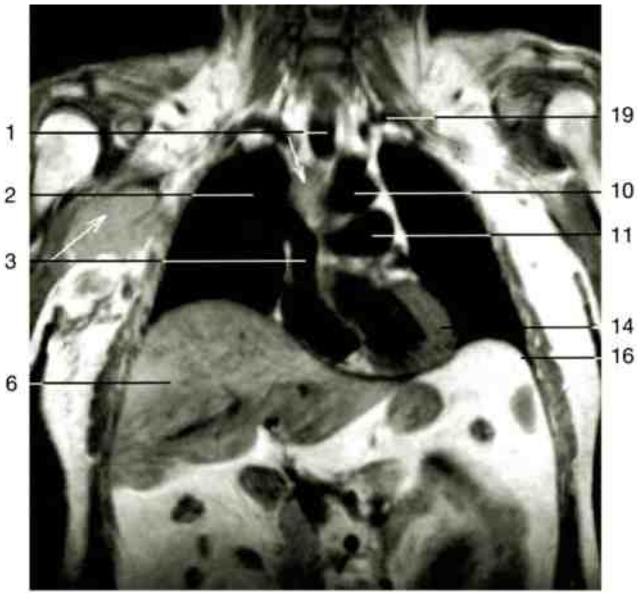


Coronal section through the thorax at the level of ascending aorta (MRI scan).

1	Clavicle
2	Left brachiocephalic vein
3	Upper lobe of right lung
4	Aortic arch
5	Superior vena cava
6	Right atrium (entrance of inferior vena cava)
7	Coronary sinus
8	Liver
9	Second rib
10	Upper lobe of left lung
11	Pulmonary trunk
12	Ascending aorta and left coronary artery
13	Aortic valve
14	Pericardium
15	Myocardium of left ventricle
16	Lower lobe of left lung
17	Diaphragm
18	Colic flexures
19	Stomach
20	Brachiocephalic trunk

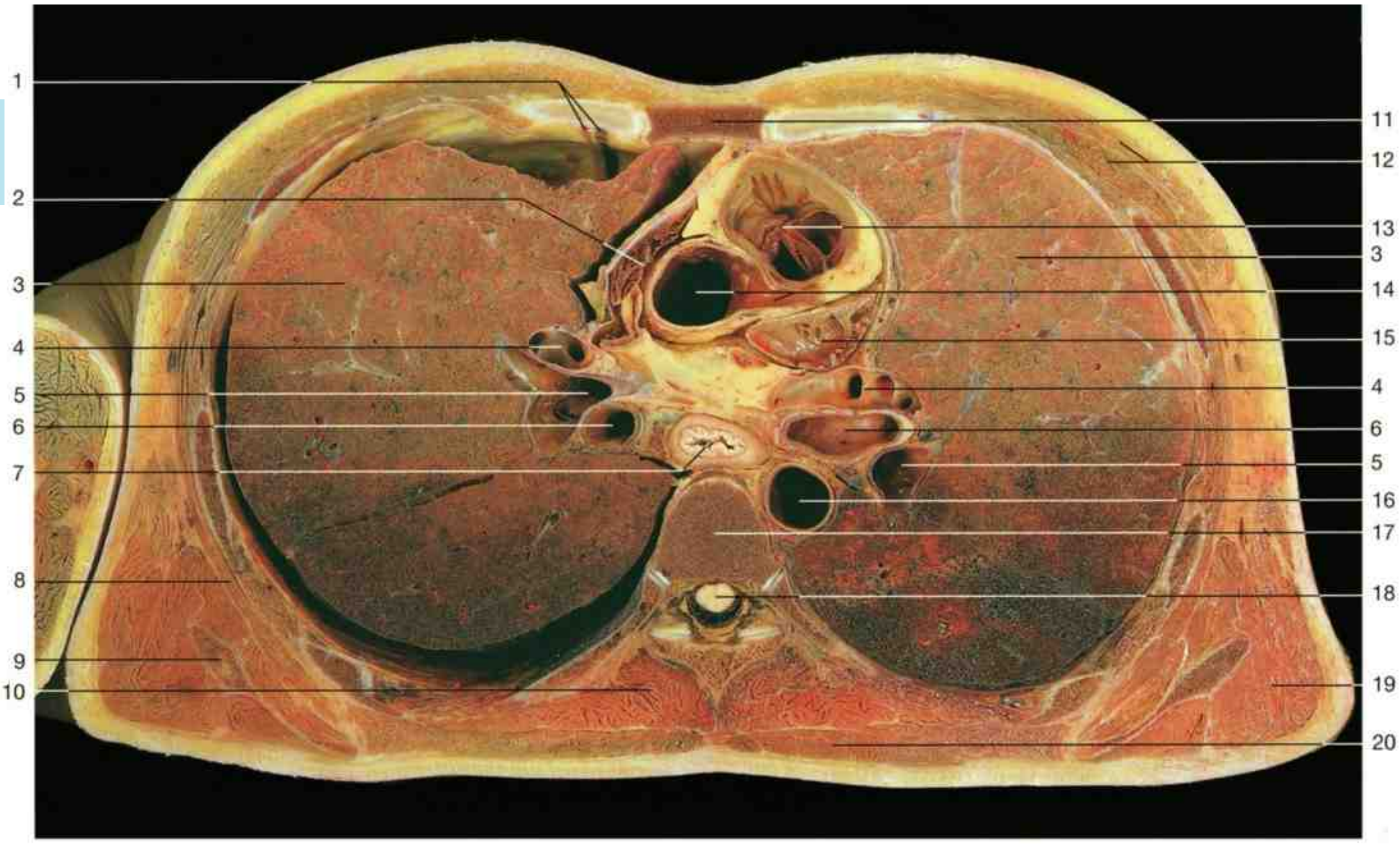


Coronal section through the thorax at the level of superior and inferior vena cava (anterior aspect).

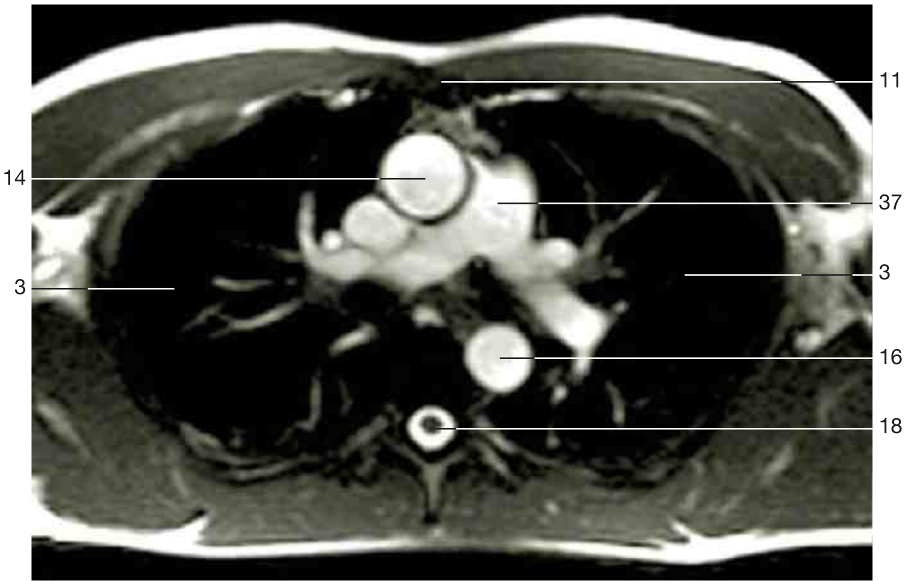


Coronal section through the thorax at the level of superior vena cava (MRI scan). Arrows = metastases of tumor.

1 Trachea
2 Upper lobe of right lung
3 Superior vena cava
4 Right pulmonary veins
5 Inferior vena cava and right atrium
6 Liver
7 Left common carotid artery
8 Left subclavian vein
9 Upper lobe of left lung
10 Aortic arch
11 Left pulmonary artery
12 Left auricle
13 Left atrium with orifices of pulmonary veins
14 Left ventricle (myocardium)
15 Pericardium
16 Diaphragm
17 Left colic flexure
18 Stomach
19 Left subclavian artery

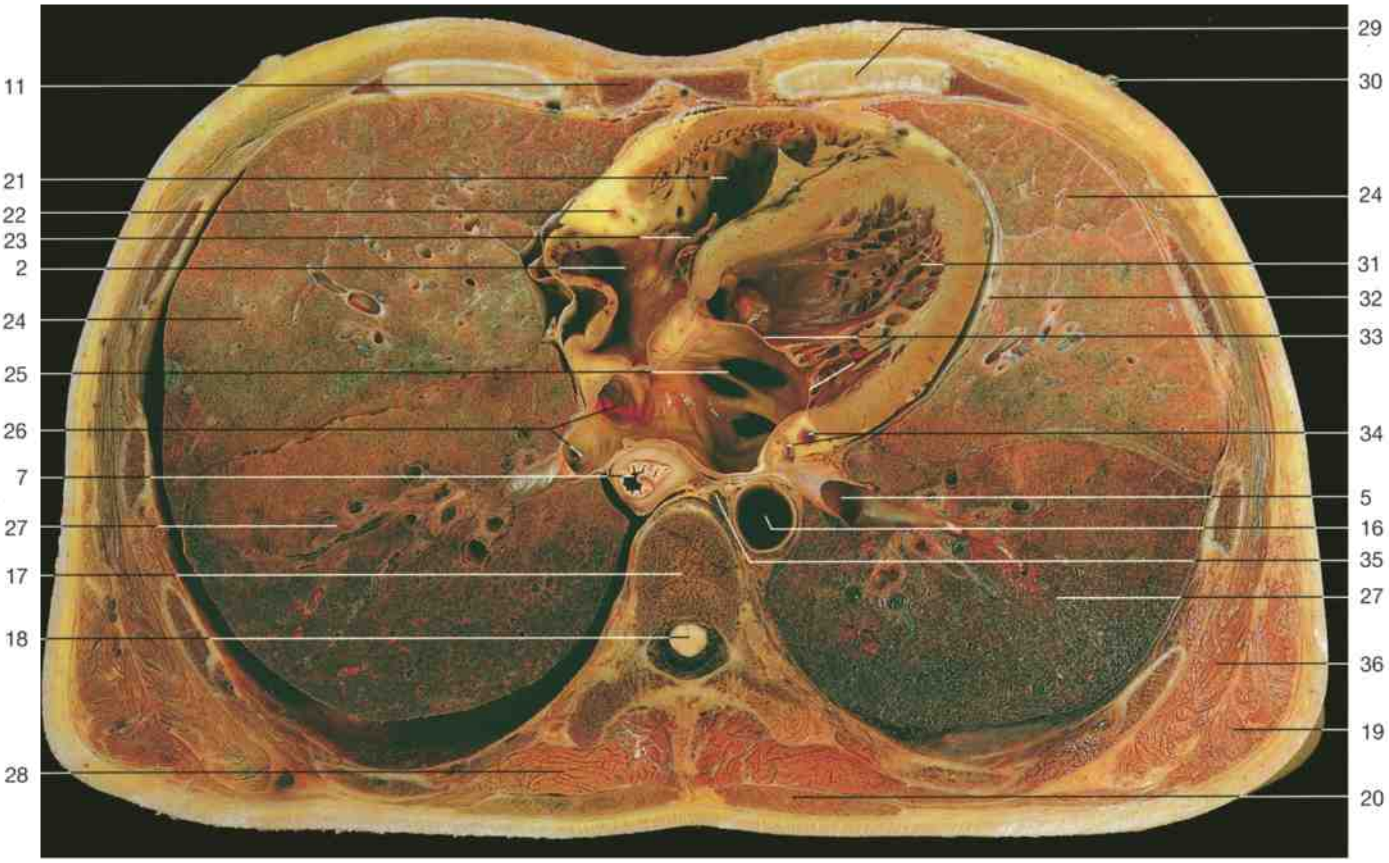


Horizontal section through the thorax at level 1 (from below).



Horizontal section through the thorax at level 1 (from below). (MRI scan, courtesy of Prof. W. Bautz and R. Janka, M. D., University of Erlangen, Germany.)

1 Internal thoracic artery and vein
2 Right atrium
3 Lung
4 Pulmonary artery
5 Pulmonary vein
6 Primary bronchus
7 Esophagus
8 Serratus anterior muscle
9 Scapula
10 Longissimus thoracis muscle
11 Sternum
12 Pectoralis major and minor muscles
13 Conus arteriosus (right ventricle), pulmonic valve
14 Ascending aorta and left coronary artery (only in upper figure)
15 Left atrium
16 Descending aorta
17 Thoracic vertebra
18 Spinal cord
19 Latissimus dorsi muscle
20 Trapezius muscle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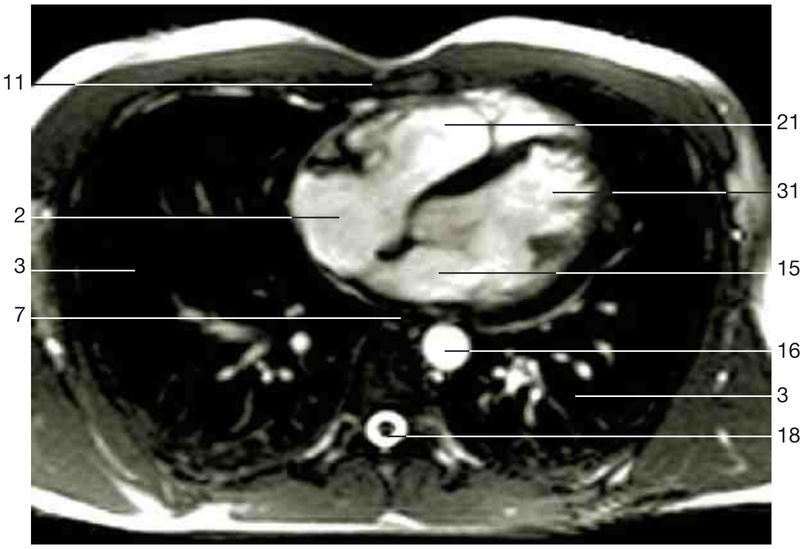
Horizontal section through the thorax at level 2 (from below).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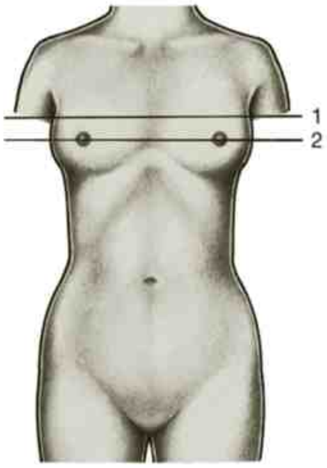
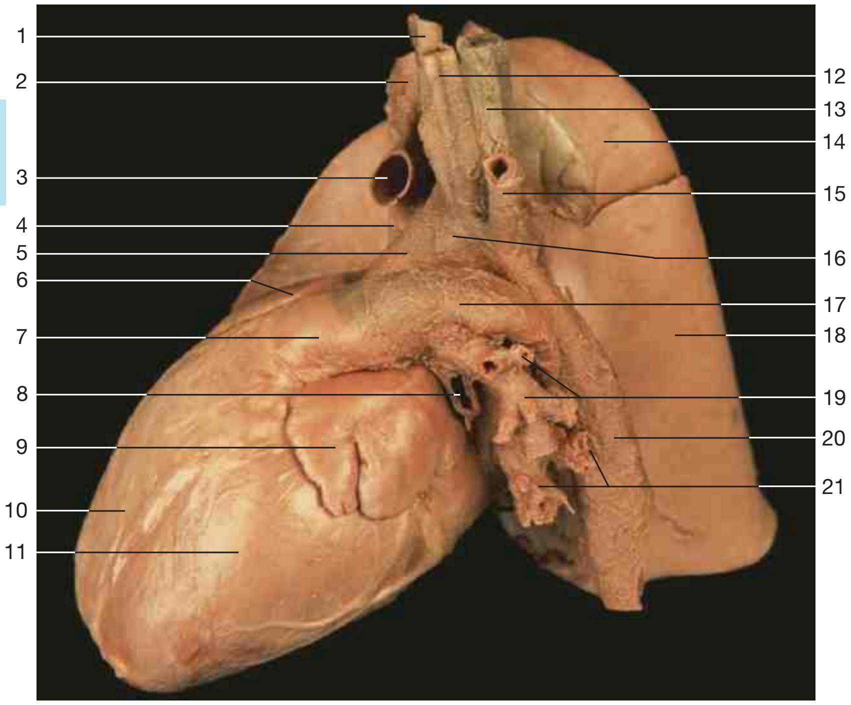
Horizontal section through the thorax at level 2 (from below). (MRI scan, courtesy of Prof. W. Bautz and R. Janka, M. D., University of Erlangen, Germany.)

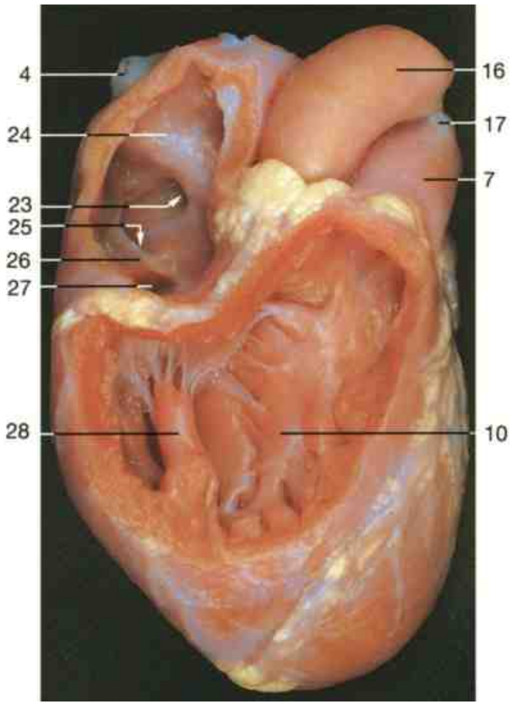


Levels of sections.

21	Right ventricle
22	Right coronary artery
23	Right atrioventricular valve
24	Lung (upper lobe)
25	Left atrium
26	Pulmonary veins
27	Lung (lower lobe)
28	Erector muscle of spine
29	Third costal cartilage
30	Nipple
31	Left ventricle
32	Pericardium
33	Left atrioventricular valve
34	Left coronary artery and coronary sinus
35	Accessory hemiazygos vein
36	Serratus anterior muscle
37	Pulmonary trunk



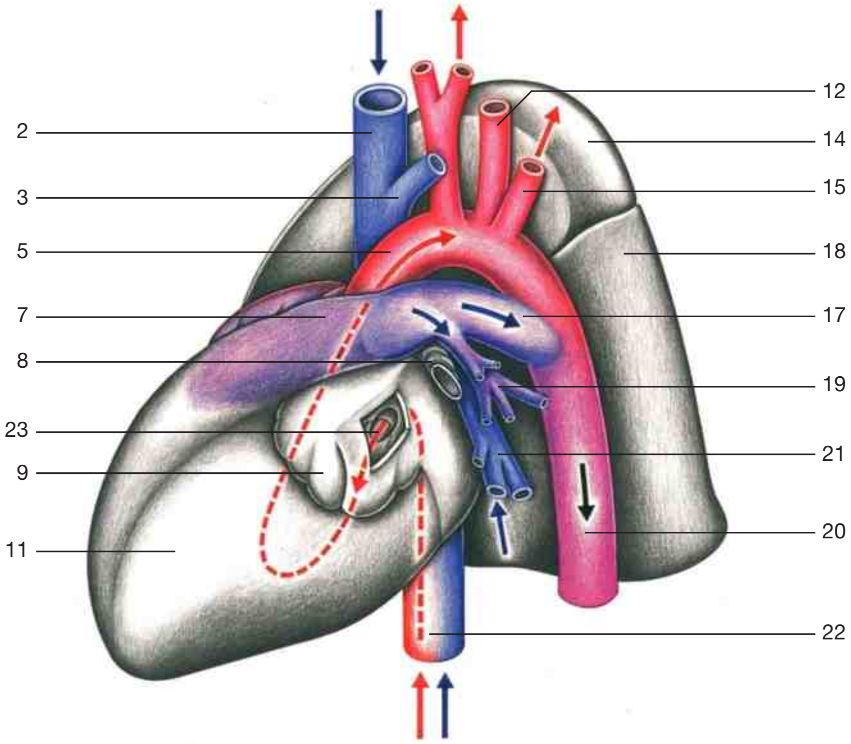
Heart and right lung of the fetus (viewed from left side). The left lung has been removed. Note the ductus arteriosus (Botalli).



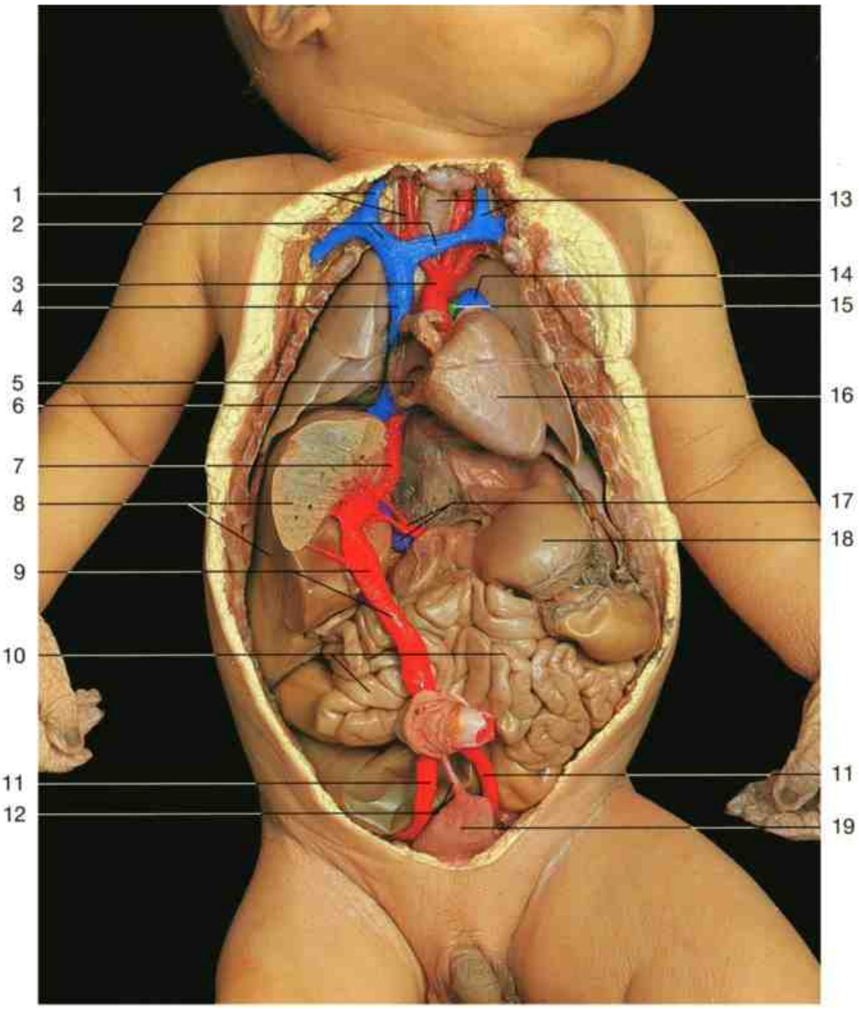
Heart of the fetus (anterior aspect). Right atrium and ventricle opened.

Shunts in the fetal circulation system		
1. Ductus venosus (of Arantius)	between umbilical vein and inferior vena cava	bypass of liver circulation
2. Foramen ovale	between right and left atrium	bypass of pulmonary circulation
3. Ductus arteriosus (Botalli)	between pulmonary trunk and aorta	

1 Right common carotid artery
2 Right brachiocephalic vein
3 Left brachiocephalic vein
4 Superior vena cava
5 Ascending aorta
6 Right auricle
7 Pulmonary trunk
8 Left primary bronchus
9 Left auricle
10 Right ventricle
11 Left ventricle
12 Left common carotid artery
13 Trachea
14 Superior lobe of right lung
15 Left subclavian artery
16 Aortic arch
17 Ductus arteriosus (Botalli)
18 Inferior lobe of right lung
19 Left pulmonary artery with branches to the left lung
20 Descending aorta
21 Left pulmonary veins
22 Inferior vena cava
23 Foramen ovale
24 Right atrium
25 Opening of inferior vena cava
26 Valve of inferior vena cava (Eustachian valve)
27 Opening of coronary sinus
28 Anterior papillary muscle of right ventricle

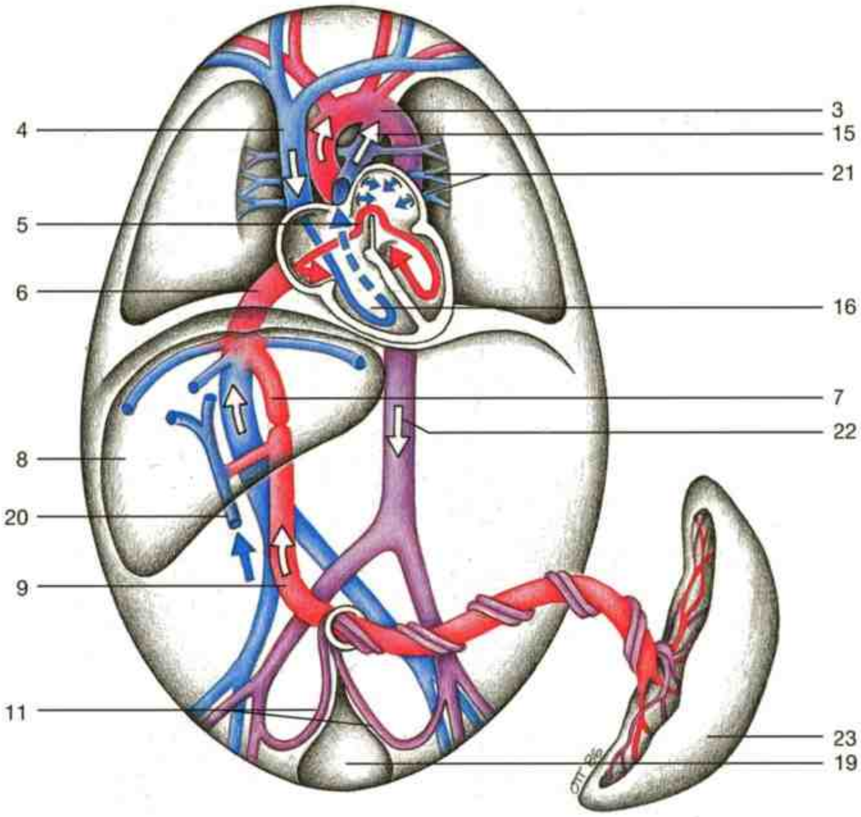


◁ **Heart of the fetus** (schematic drawing). Direction of blood flow indicated by arrows. Note the change in oxygenation of blood after ductus arteriosus entry into aorta.

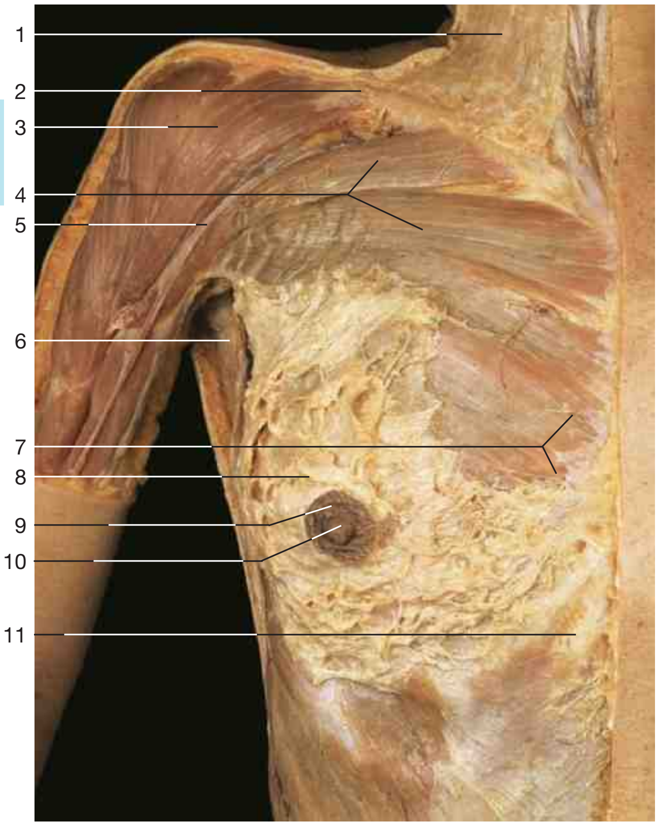


Thoracic and abdominal organs in the newborn (anterior aspect). The right atrium has been opened to show the foramen ovale. The left lobe of the liver has been removed.

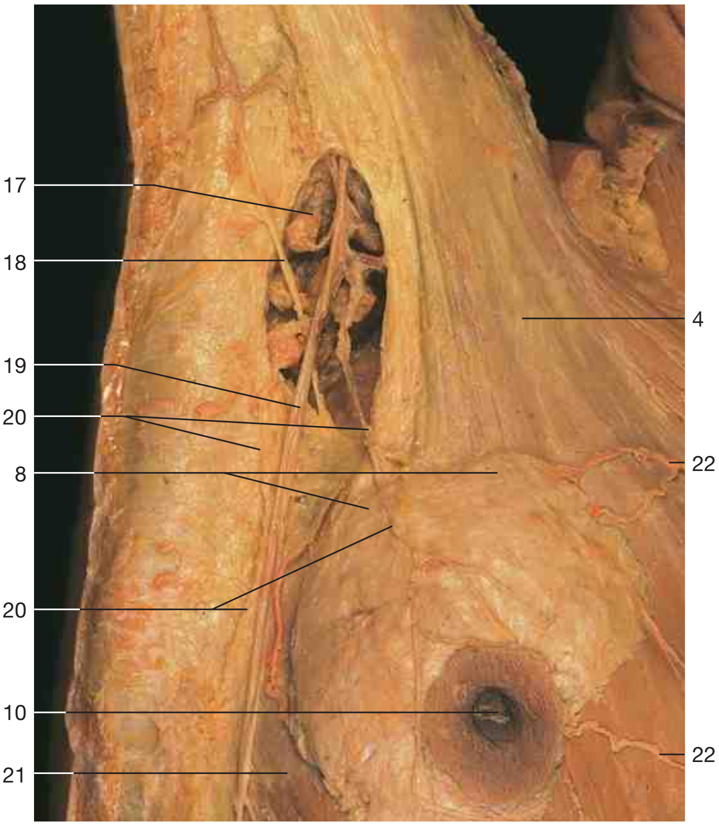
1 Internal jugular vein and right common carotid artery
2 Right and left brachiocephalic vein
3 Aortic arch
4 Superior vena cava
5 Foramen ovale
6 Inferior vena cava
7 Ductus venosus
8 Liver
9 Umbilical vein
10 Small intestine
11 Umbilical artery
12 Urachus
13 Trachea and left internal jugular vein
14 Left pulmonary artery
15 Ductus arteriosus (Botalli)
16 Right ventricle
17 Hepatic arteries (red) and portal vein (blue)
18 Stomach
19 Urinary bladder
20 Portal vein
21 Pulmonary veins
22 Descending aorta
23 Placenta



◁ **Fetal circulatory system** (schematic drawing). The oxygen gradient is indicated by color.

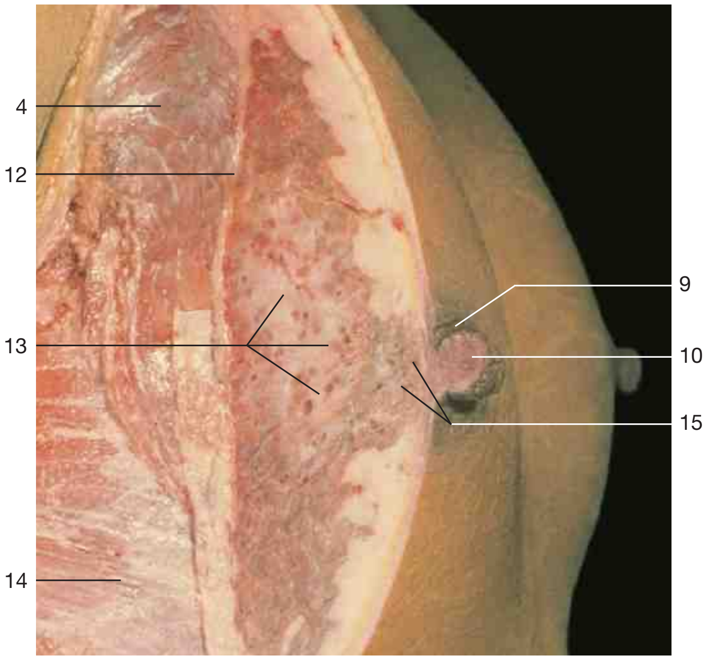


Dissection of mammary gland (anterior aspect).

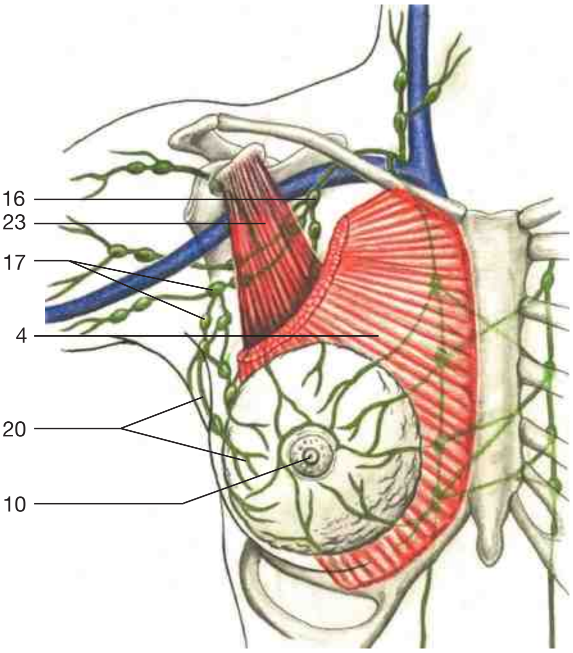


Dissection of mammary gland and axillary lymph nodes.

1 Platysma muscle
2 Clavicle
3 Deltoid muscle
4 Pectoralis major muscle
5 Deltopectoral groove and cephalic vein
6 Latissimus dorsi muscle
7 Medial mammarian branches of intercostal nerves
8 Breast tissue
9 Areola
10 Nipple (papilla)
11 Costal margin
12 Pectoral fascia
13 Mammary gland
14 Serratus anterior muscle (insertion)
15 Lactiferous sinus
16 Apical lymph nodes
17 Axillary lymph nodes
18 Intercostobrachial nerve
19 Lateral thoracic vein
20 Lymph vessels
21 Serratus anterior muscle
22 Medial branches of intercostal arteries
23 Pectoralis minor muscle



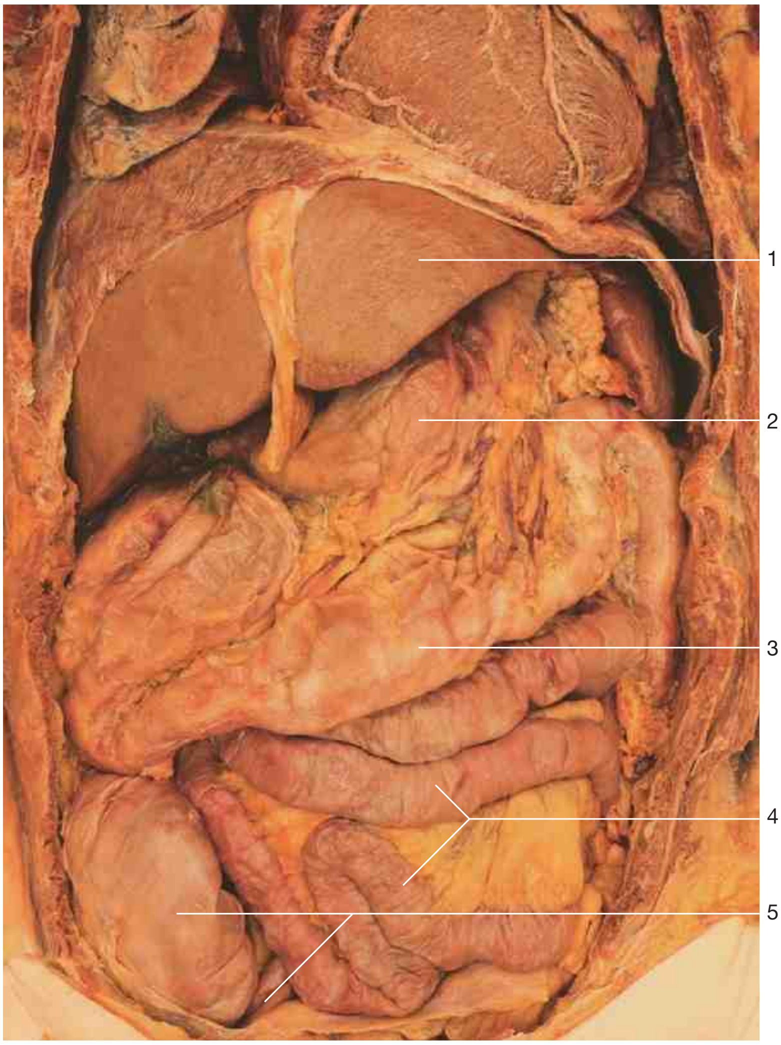
Mammary gland (sagittal section) of a pregnant female.



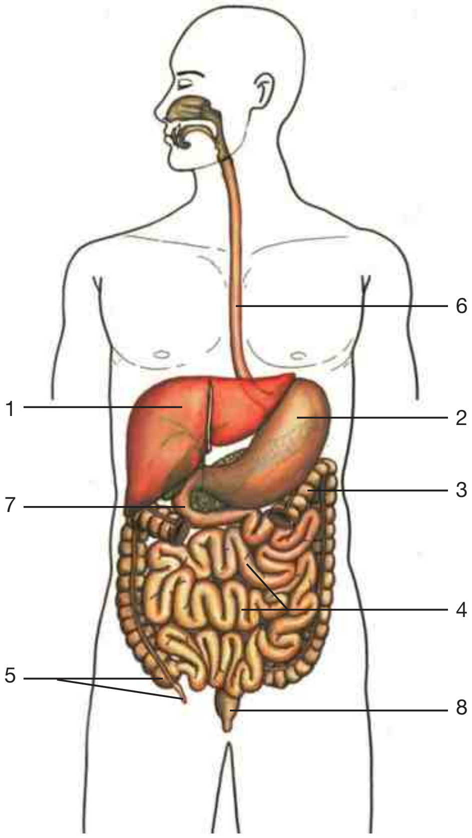
Lymphatics of the breast and axilla. Most lymph vessels drain into the axillary lymph nodes.

5 Abdominal Organs

The abdominal cavity located underneath the diaphragm contains the main organs of the digestive system (liver, spleen, stomach, intestine). The greater omentum partly fixed to the transverse colon covers the small intestine.
The liver, stomach, and superior part of the duodenum are connected to the lesser omentum covering the omental bursa, the entrance of which is the epiploic foramen.
The hepatoduodenal ligament contains the portal vein, the common bile duct, and the hepatic arteries. The spleen is located dorsally underneath the diaphragm.

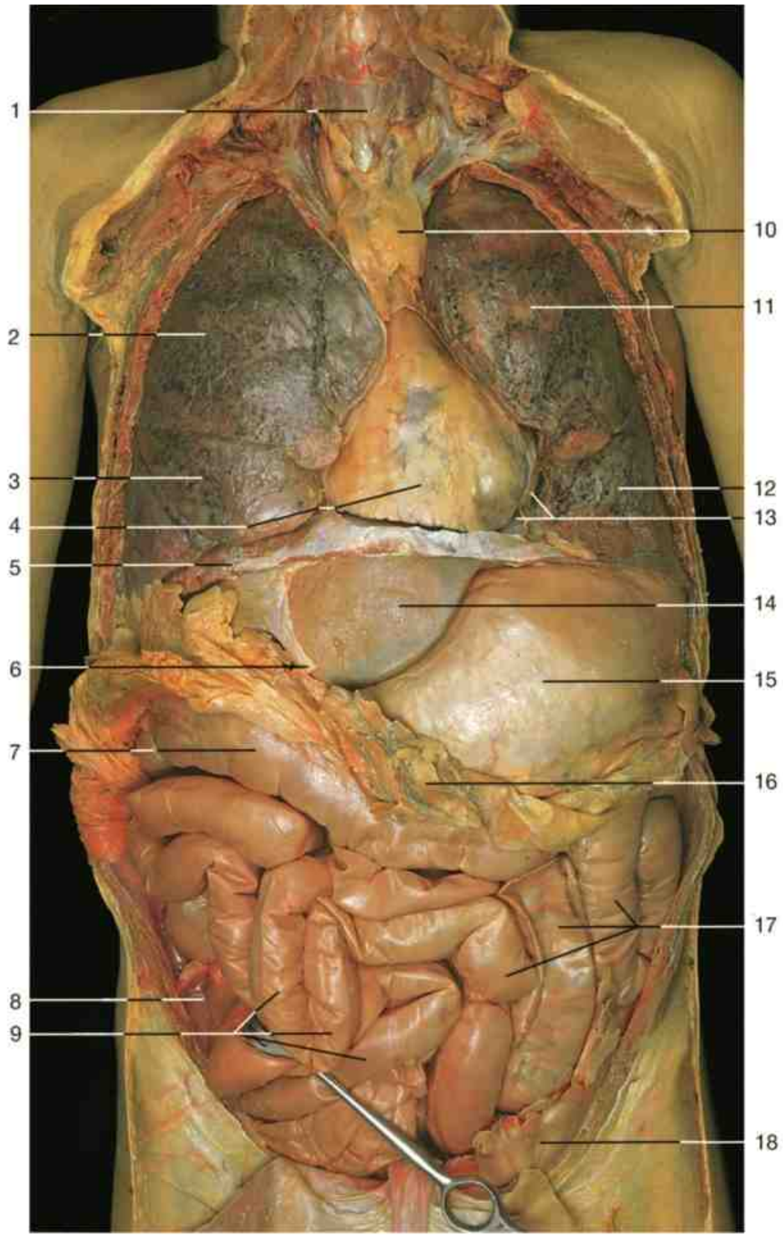


Abdominal organs in situ (anterior aspect). The greater omentum and part of the diaphragm have been removed. The heart is in contact with the diaphragm (from Lütjen-Drecoll, Rohen, Innenansichten des menschlichen Körpers, 2010).



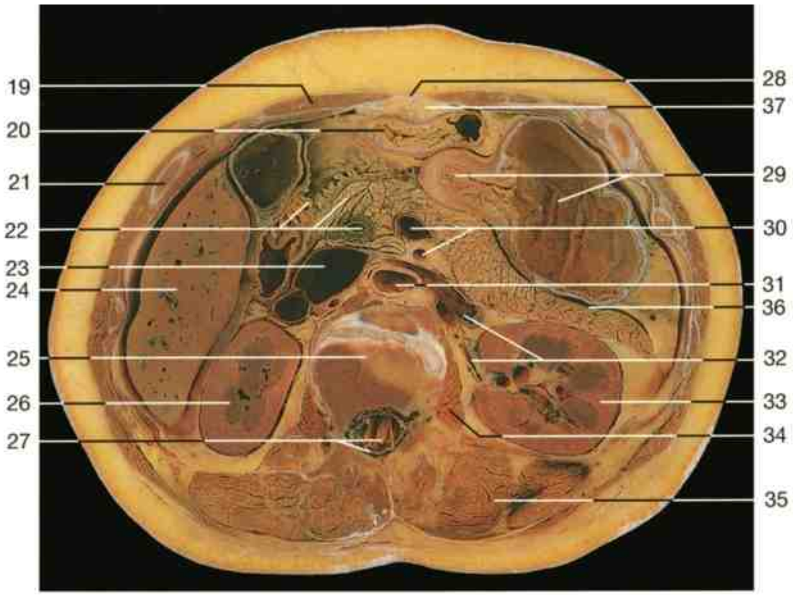
Organization of the digestive system (anterior aspect). Position of the abdominal organs.

1 Liver
2 Stomach
3 Transverse colon
4 Small intestine
5 Hindgut (cecum) with vermiform appendix
6 Esophagus
7 Duodenum
8 Rectum

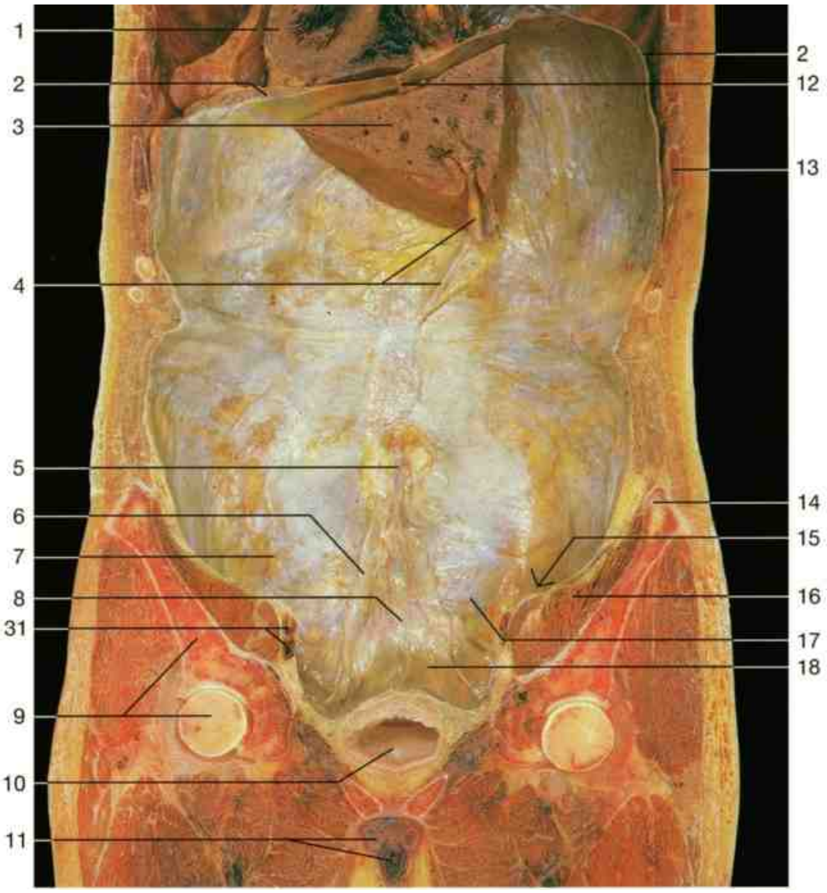


Abdominal organs in situ. The greater omentum has been partly removed or reflected.

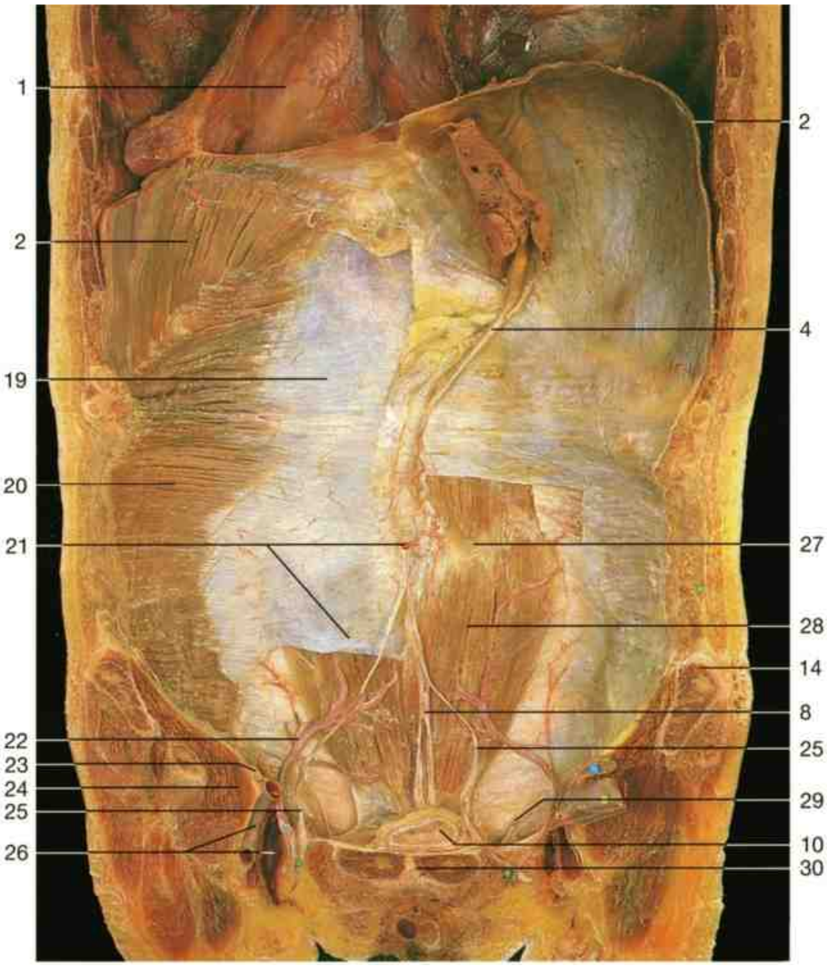
1	Thyroid gland
2	Upper lobe of right lung
3	Middle lobe of right lung
4	Heart
5	Diaphragm
6	Round ligament of liver (ligamentum teres)
7	Transverse colon
8	Cecum
9	Small intestine (ileum)
10	Thymus
11	Upper lobe of left lung
12	Lower lobe of left lung
13	Pericardium (cut edge)
14	Liver (left lobe)
15	Stomach
16	Greater omentum
17	Small intestine (jejunum)
18	Sigmoid colon
19	Rectus abdominis muscle
20	Small intestine (section)
21	Rib
22	Common bile duct, duodenum, and pancreas
23	Inferior vena cava
24	Liver
25	Body of second lumbar vertebra
26	Right kidney
27	Cauda equina and dura mater
28	Linea alba
29	Stomach and pylorus
30	Superior mesenteric artery and vein
31	Abdominal aorta
32	Left renal artery and vein
33	Left kidney
34	Psoas major muscle
35	Deep muscles of the back
36	Pancreas adjacent to lesser sac (omental bursa)
37	Falciform ligament with ligamentum teres



Transverse section through the abdominal cavity at the level of the second lumbar vertebra (from below).

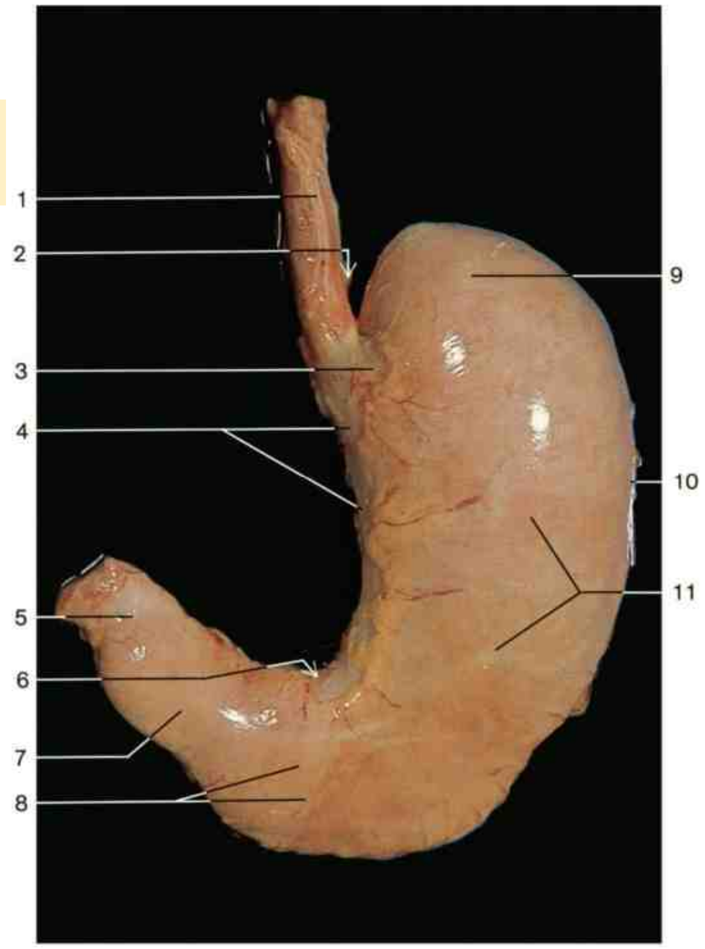


Anterior abdominal wall with pelvic cavity and thigh (frontal section, male) (internal aspect).

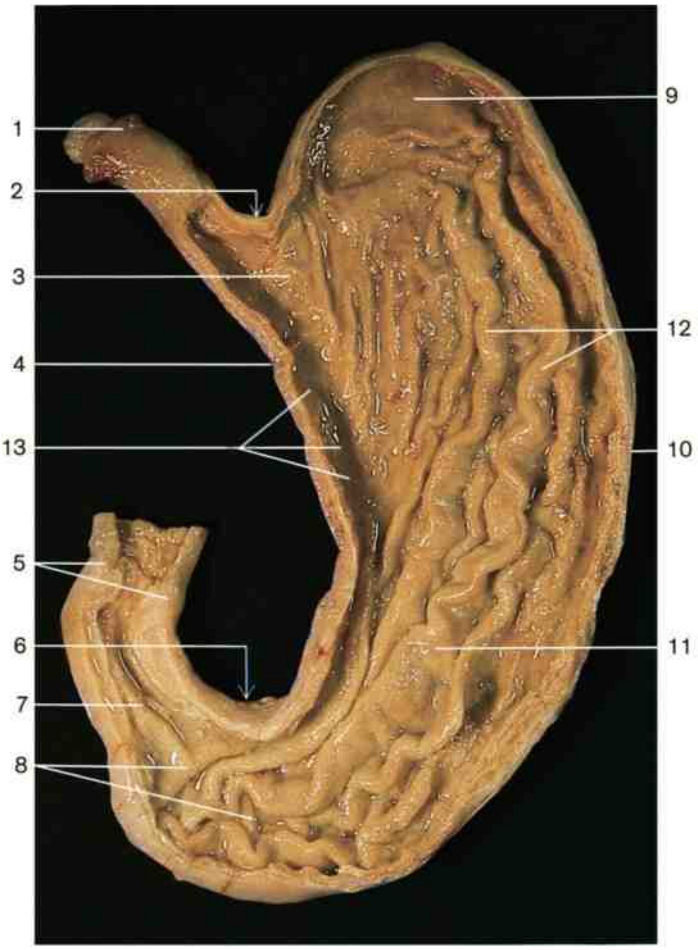


Anterior abdominal wall (male) (internal aspect). The peritoneum and parts of the posterior layer of rectus sheath have been removed. Dissection of inferior epigastric arteries and veins.

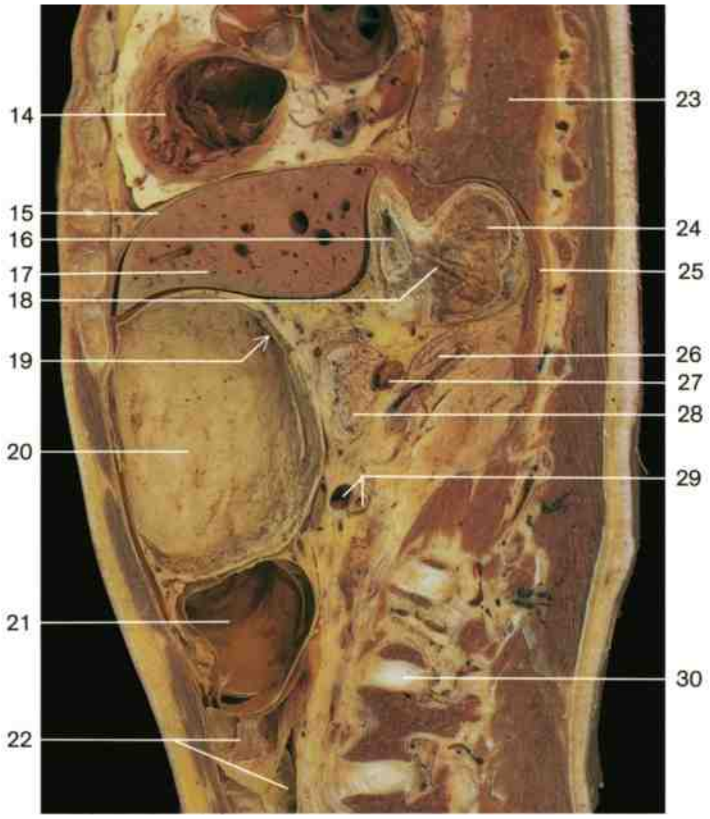
1 Left ventricle with pericardium
2 Diaphragm
3 Remnant of liver
4 Ligamentum teres (free margin of falciform ligament)
5 Site of umbilicus
6 Medial umbilical fold (containing the obliterated umbilical artery)
7 Lateral umbilical fold (containing inferior epigastric artery and vein)
8 Median umbilical fold (containing remnant of urachus)
9 Head of femur and pelvic bone
10 Urinary bladder
11 Root of penis
12 Falciform ligament of liver
13 Rib (divided)
14 Iliac crest (divided)
15 Site of deep inguinal ring and lateral inguinal fossa
16 Iliopsoas muscle (divided)
17 Medial inguinal fossa
18 Supravesical fossa
19 Posterior layer of rectus sheath
20 Transversus abdominis muscle
21 Umbilicus and arcuate line
22 Inferior epigastric artery
23 Femoral nerve
24 Iliopsoas muscle
25 Remnant of umbilical artery
26 Femoral artery and vein
27 Tendinous intersection of rectus abdominis muscle
28 Rectus abdominis muscle
29 Interfoveolar ligament
30 Pubic symphysis (divided)
31 External iliac artery and vein



Stomach (ventral aspect).

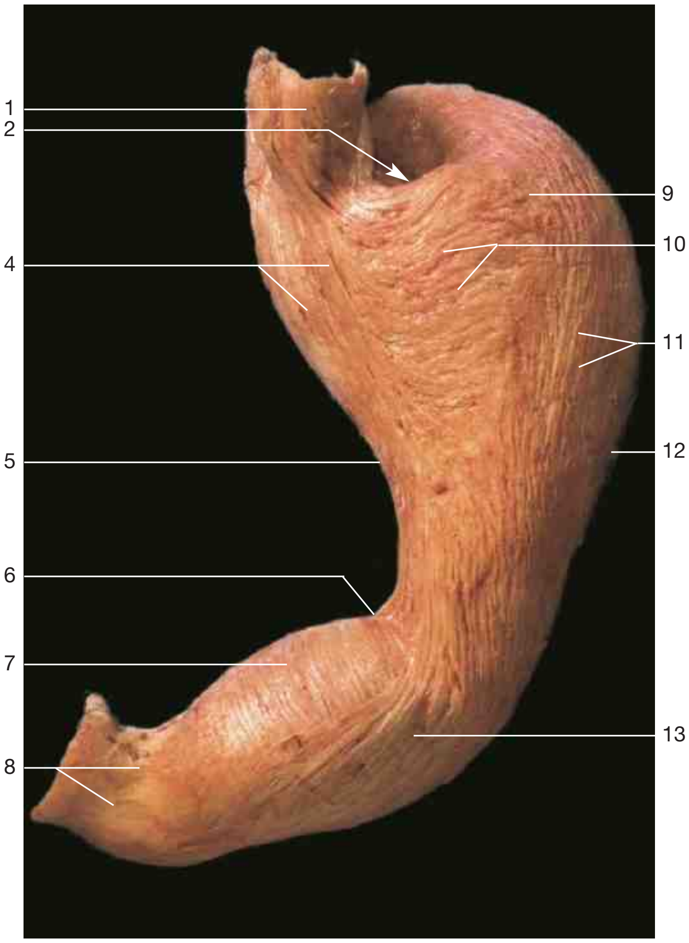


Mucosa of posterior wall of stomach (ventral aspect).

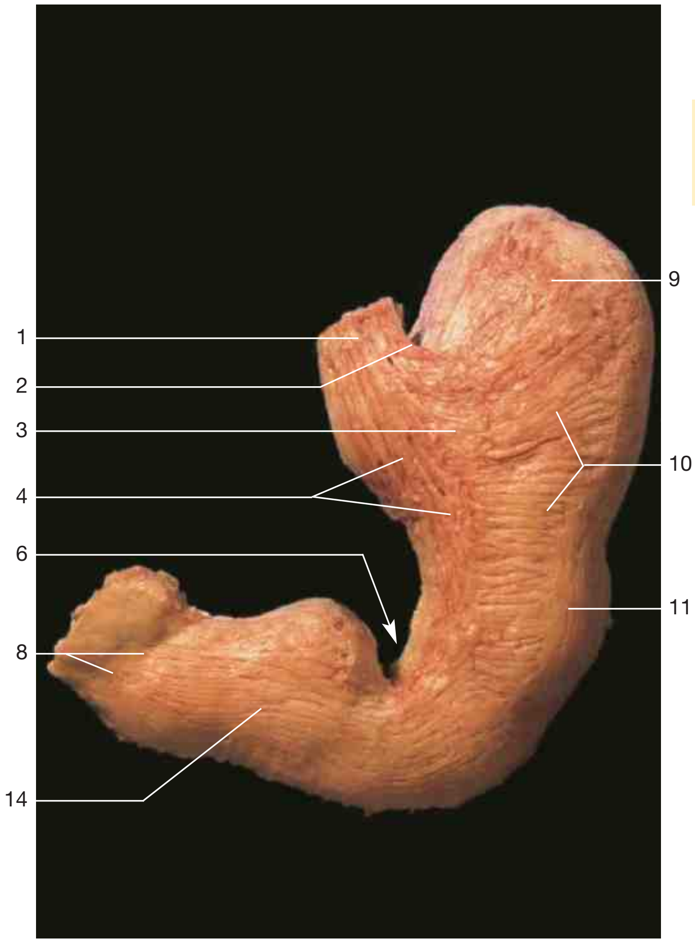


Position of the stomach. Parasagittal section through upper part of left abdominal cavity 3.5 cm lateral to median plane.

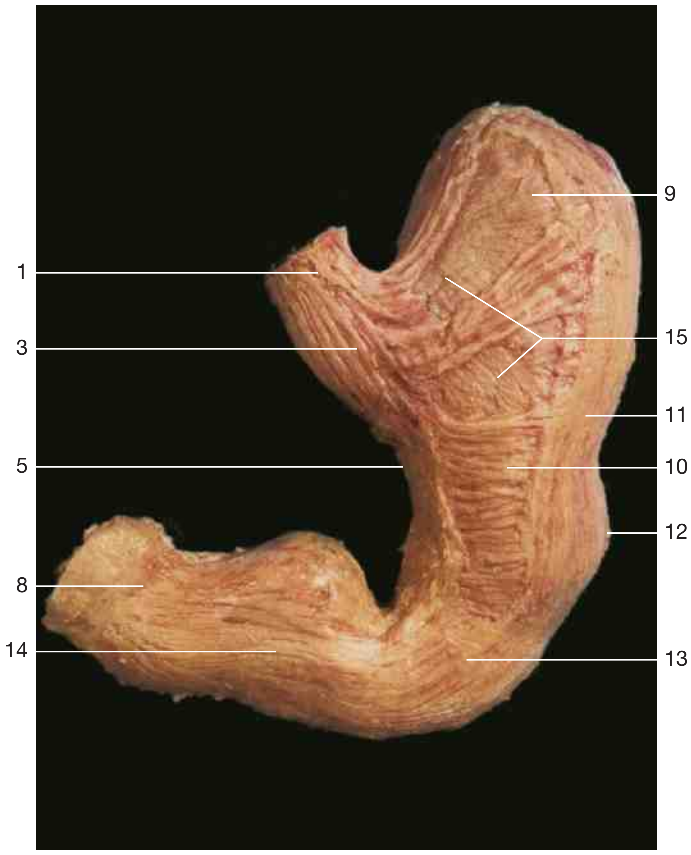
1 Esophagus
2 Cardial notch
3 Cardial part of stomach
4 Lesser curvature of stomach
5 Pyloric sphincter
6 Angular notch (incisura angularis)
7 Pyloric canal
8 Pyloric antrum
9 Fundus of stomach
10 Greater curvature of stomach
11 Body of stomach
12 Folds of mucous membrane (gastric rugae)
13 Gastric canal
14 Right ventricle of heart
15 Diaphragm (cut edge)
16 Abdominal portion of esophagus
17 Liver
18 Cardial part of stomach (cut edge)
19 Position of pyloric canal
20 Body of stomach
21 Transverse colon
22 Small intestine
23 Lung (cut edge)
24 Fundus of stomach (section)
25 Lumbar portion of diaphragm (cut edge)
26 Suprarenal gland
27 Splenic vein
28 Pancreas
29 Superior mesenteric artery and vein
30 Intervertebral disc



Muscular coat of stomach, outer layer (ventral aspect).

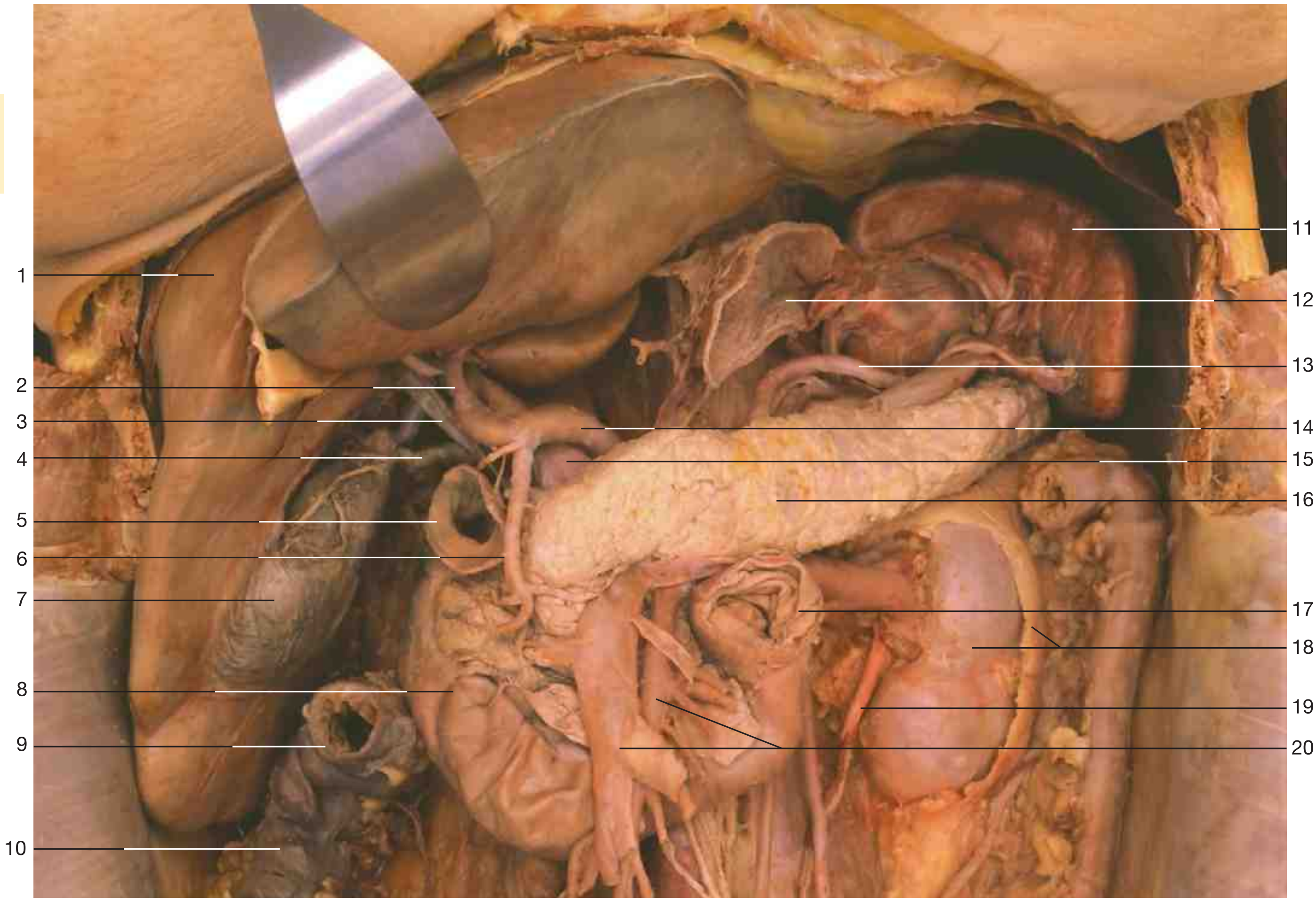


Muscular coat of stomach, middle layer (ventral aspect).

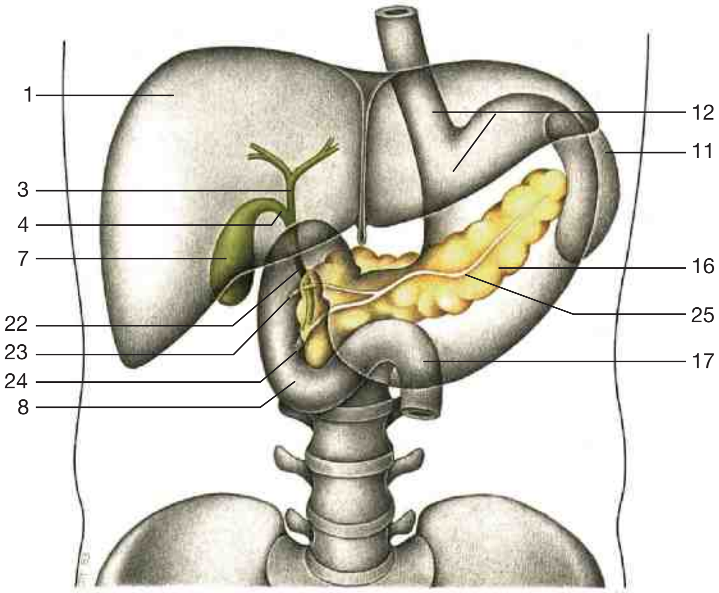


Muscular coat of stomach, inner layer (ventral aspect).

1	Esophagus (abdominal part)
2	Cardial notch
3	Cardial part of stomach
4	Longitudinal muscle layer at lesser curvature of stomach
5	Lesser curvature
6	Incisura angularis
7	Circular muscle layer of pyloric part of stomach
8	Pyloric sphincter muscle
9	Fundus of stomach
10	Circular muscle layer of fundus of stomach
11	Longitudinal muscle layer of greater curvature of stomach
12	Greater curvature of stomach
13	Longitudinal muscle layer (transition from body to pyloric part of stomach)
14	Pyloric part of stomach
15	Oblique muscle fibers

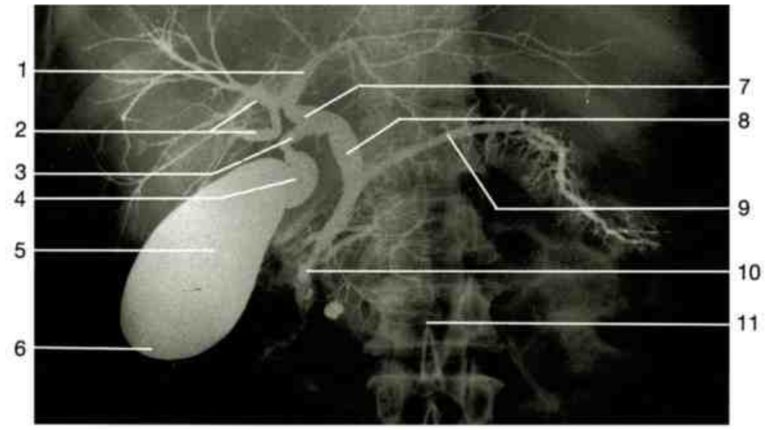


Upper abdominal organs. Pancreas, duodenum, and left kidney are shown. Stomach and transverse colon have been removed, liver elevated; superior mesenteric vein is slightly enlarged.

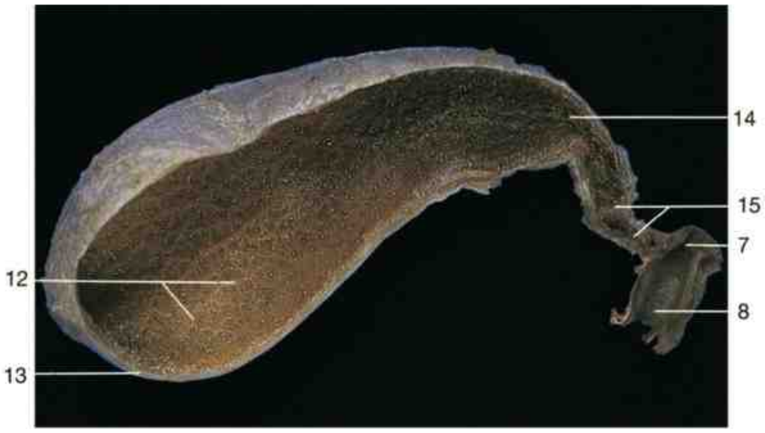


Pancreas, duodenum, and extrahepatic bile ducts (anterior aspect, schematic drawing).

1	Liver
2	Hepatic artery proper
3	Hepatic duct
4	Cystic duct
5	Pylorus
6	Gastroduodenal artery
7	Gallbladder
8	Duodenum
9	Transverse colon (cut)
10	Ascending colon
11	Spleen
12	Cardia
13	Splenic artery
14	Common hepatic artery
15	Portal vein
16	Pancreas (body)
17	Duodenojejunal flexure
18	Kidney (with capsula adiposa)
19	Ureter
20	Superior mesenteric artery and vein
21	Aorta (abdominal part)
22	Common bile duct
23	Lesser duodenal papilla
24	Greater duodenal papilla
25	Pancreatic duct

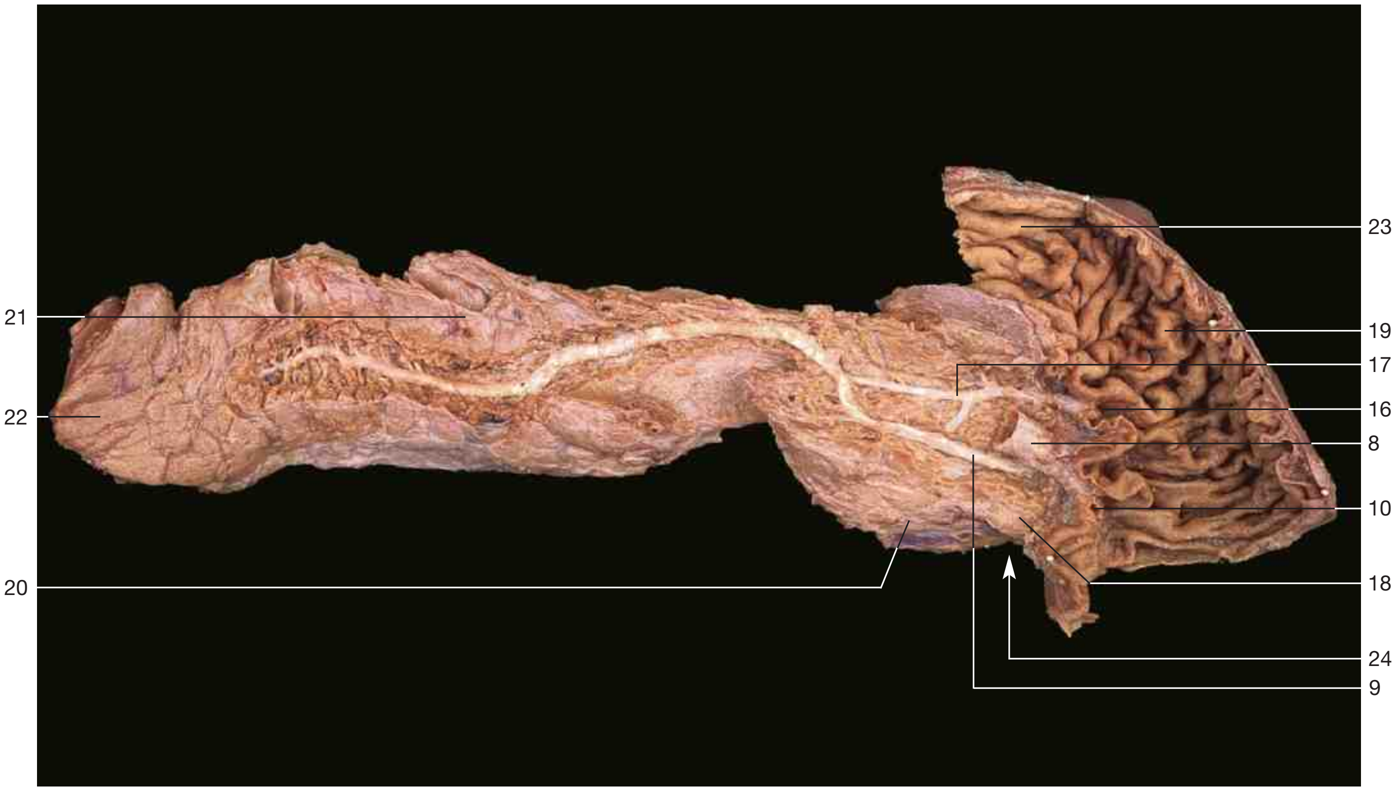


Radiograph of biliary ducts, gallbladder, and pancreatic duct (antero-posterior view).

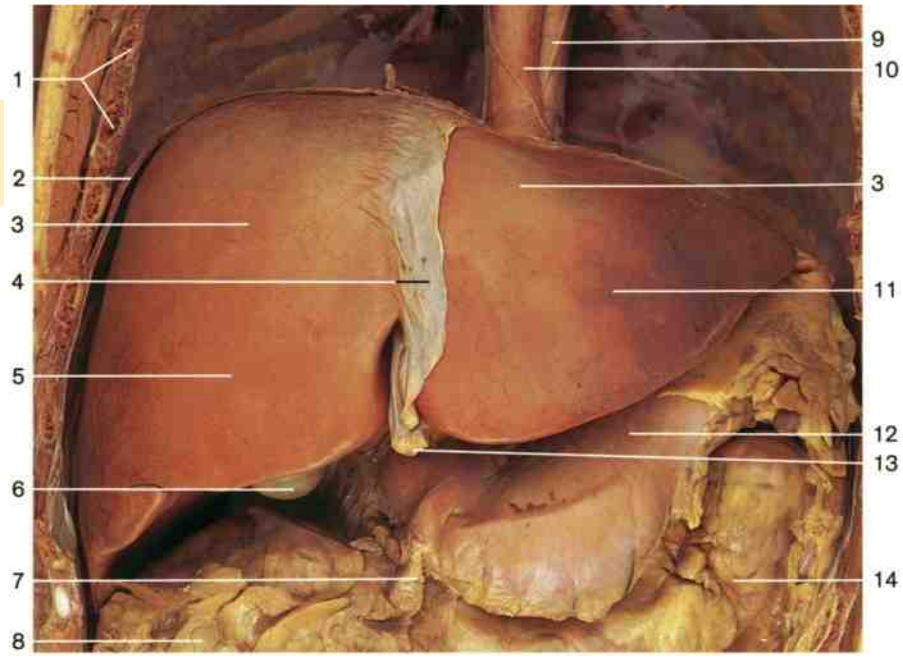


Isolated gallbladder and cystic duct (anterior aspect).
The gallbladder has been opened to display the mucous membrane.

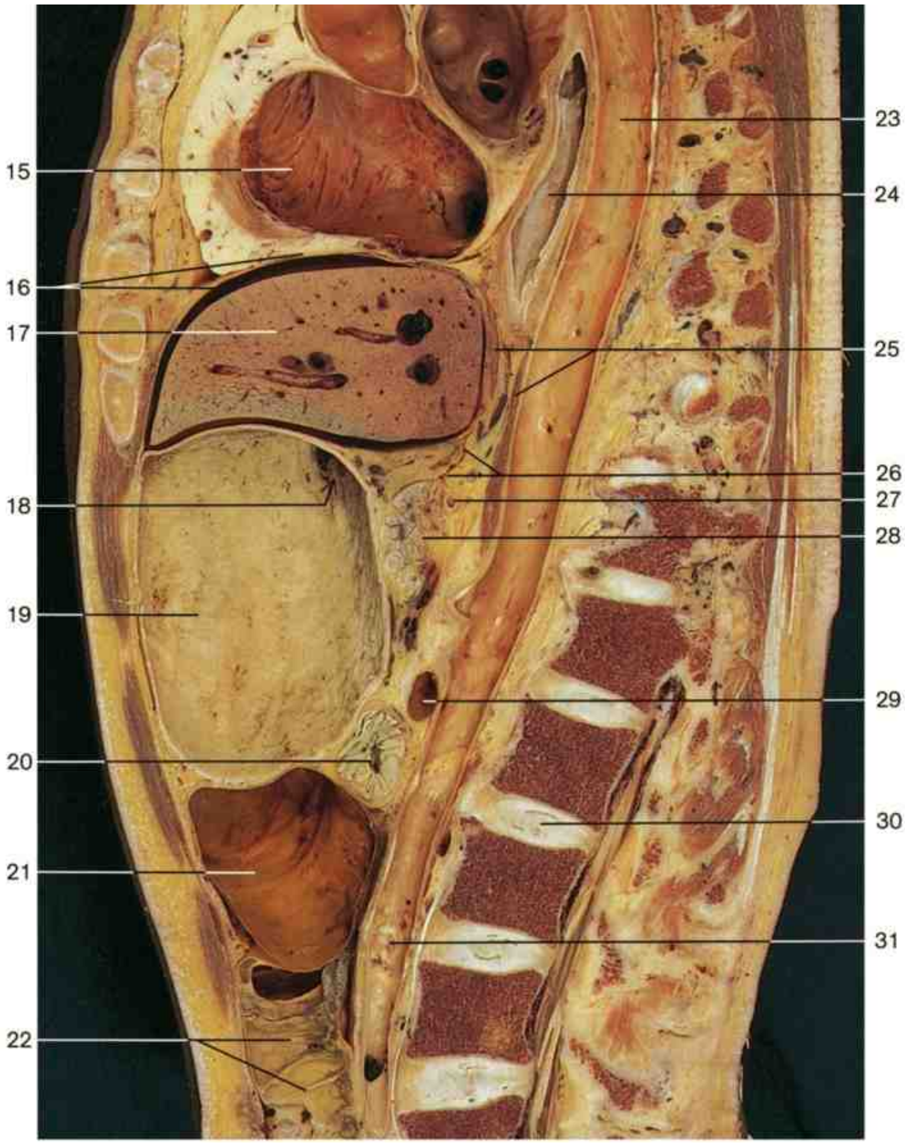
1 Left hepatic duct
2 Right hepatic duct
3 Cystic duct
4 Neck of gallbladder
5 Body of gallbladder
6 Fundus of gallbladder
7 Common hepatic duct
8 Common bile duct
9 Pancreatic duct
10 Greater duodenal papilla
11 Second lumbar vertebra
12 Folds of mucous membrane of gallbladder
13 Muscular coat of gallbladder
14 Neck of gallbladder (opened)
15 Cystic duct with spiral fold
16 Lesser duodenal papilla
17 Accessory pancreatic duct
18 Uncinate process
19 Plica circularis of duodenum (Kerckring's fold)
20 Head of pancreas
21 Body of pancreas
22 Tail of pancreas
23 Descending part of duodenum
24 Incisure of pancreas



Pancreas with descending part of duodenum (posterior aspect). The duodenum was opened to display the duodenal papillae. Pancreatic duct has been dissected, the common bile duct has been divided. The sphincter of Oddi is shown.

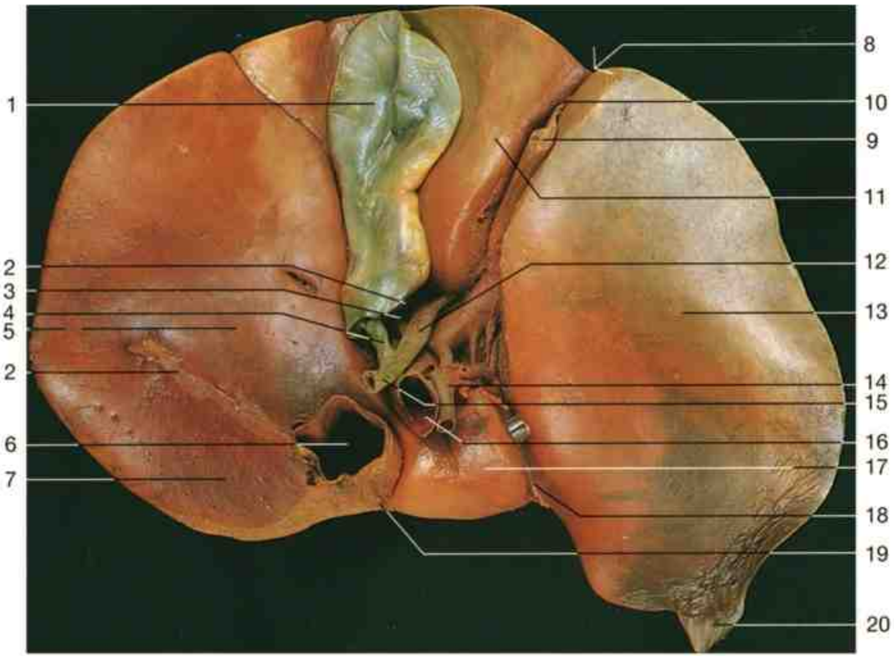


Liver in situ (ventral aspect). Part of the diaphragm has been removed.



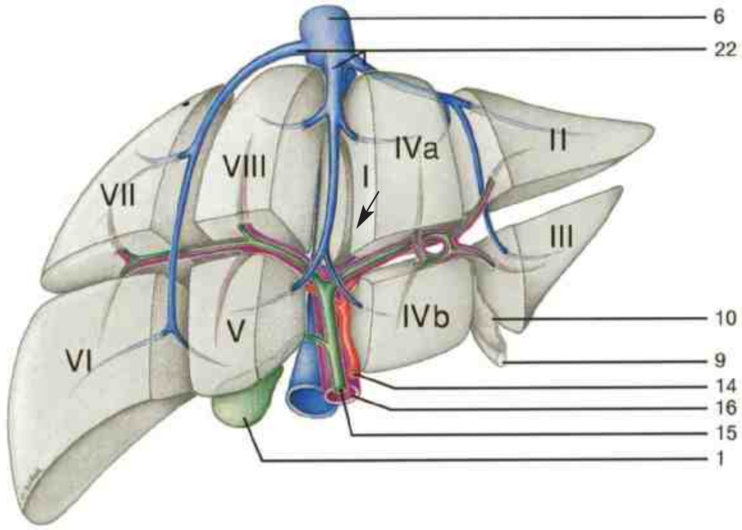
Liver in situ. Parasagittal section through the left side of the abdomen 2 cm lateral to median plane.

1 Ribs (cut edges)
2 Diaphragm
3 Diaphragmatic surface of liver
4 Falciform ligament of liver
5 Right lobe of liver
6 Fundus of gallbladder
7 Gastrocolic ligament
8 Greater omentum
9 Aorta
10 Esophagus
11 Left lobe of liver
12 Stomach
13 Ligamentum teres
14 Transverse colon
15 Right atrium of heart
16 Central tendon and sternal portion of diaphragm
17 Liver (cut edge)
18 Entrance to duodenum (pylorus)
19 Stomach
20 Duodenum
21 Transverse colon (divided, dilated)
22 Small intestine
23 Thoracic aorta (longitudinally divided)
24 Esophagus (longitudinally divided)
25 Esophageal hiatus of diaphragm
26 Omental bursa (lesser sac)
27 Splenic artery
28 Pancreas
29 Left renal vein
30 Intervertebral disc
31 Abdominal aorta (longitudinally divided)

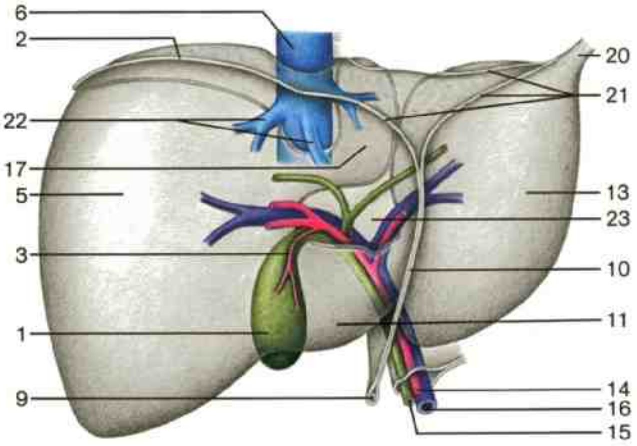


Liver (inferior aspect). Dissection of porta hepatis. Gallbladder partly collapsed. Ventral margin of liver above.

1	Fundus of gallbladder	
2	Peritoneum (cut edges)	
3	Cystic artery	
4	Cystic duct	
5	Right lobe of liver	
6	Inferior vena cava	
7	Bare area of liver	
8	Notch for ligamentum teres and falciform ligament	
9	Ligamentum teres	
10	Falciform ligament of liver	
11	Quadrate lobe of liver	
12	Common hepatic duct	
13	Left lobe of liver	
14	Hepatic artery proper	Portal triad
15	Common bile duct	
16	Portal vein	
17	Caudate lobe of liver	
18	Ligamentum venosum	
19	Ligament of inferior vena cava	
20	Appendix fibrosa (left triangular ligament)	
21	Coronary ligament of liver	
22	Hepatic veins	
23	Porta hepatis	

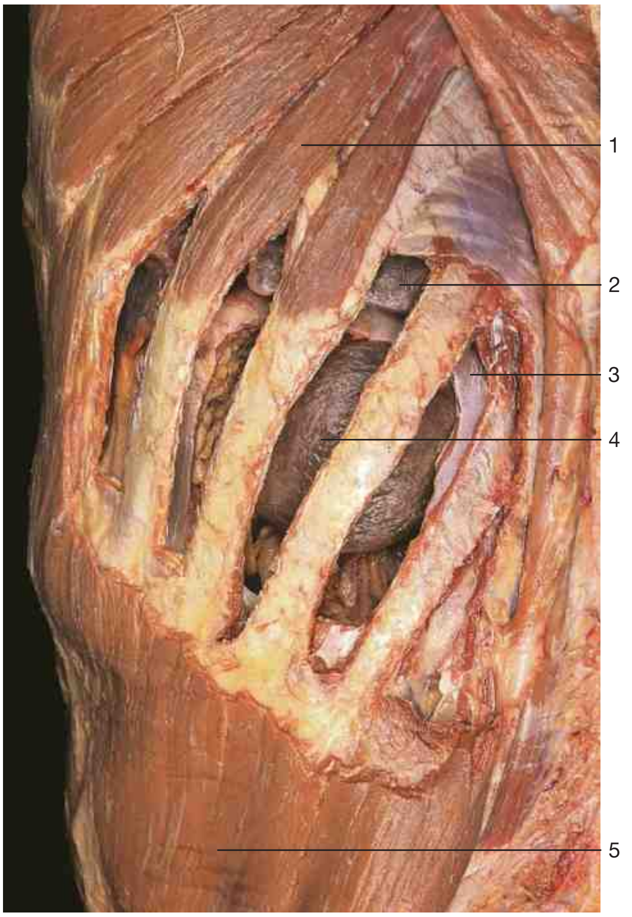


Segmentation of the liver (anterior aspect). Liver segments indicated by Roman numerals.

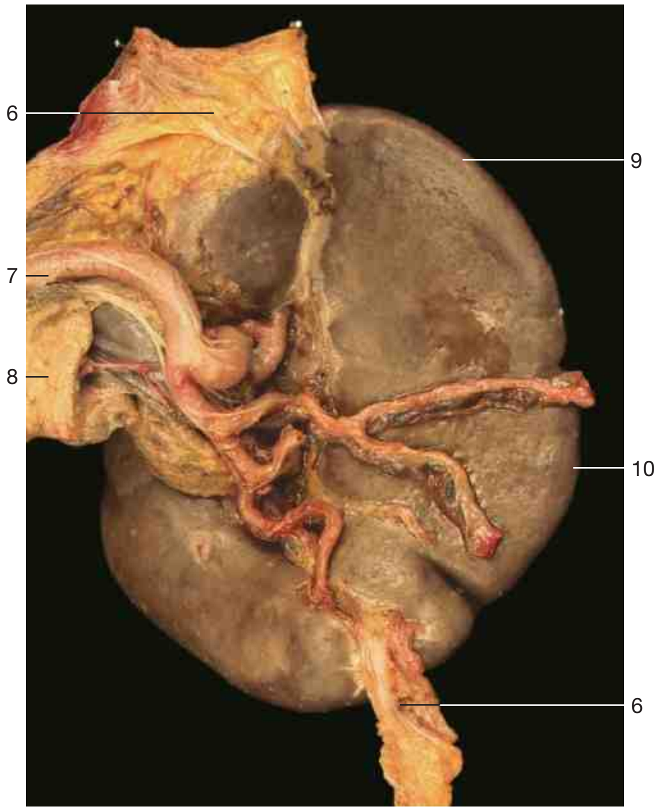


Liver (ventral aspect) (transparent drawing illustrating margins of peritoneal folds).

It should be noted that the anatomical left and right lobes of the liver do not reflect the internal distribution of the hepatic artery, portal vein, and biliary ducts. With these structures, used as criteria, the left lobe includes both the caudate and quadrate lobes, and thus the line dividing the liver into left and right functional lobes passes through the gallbladder and inferior vena cava. The three main hepatic veins drain segments of the liver that have no visible external markings.

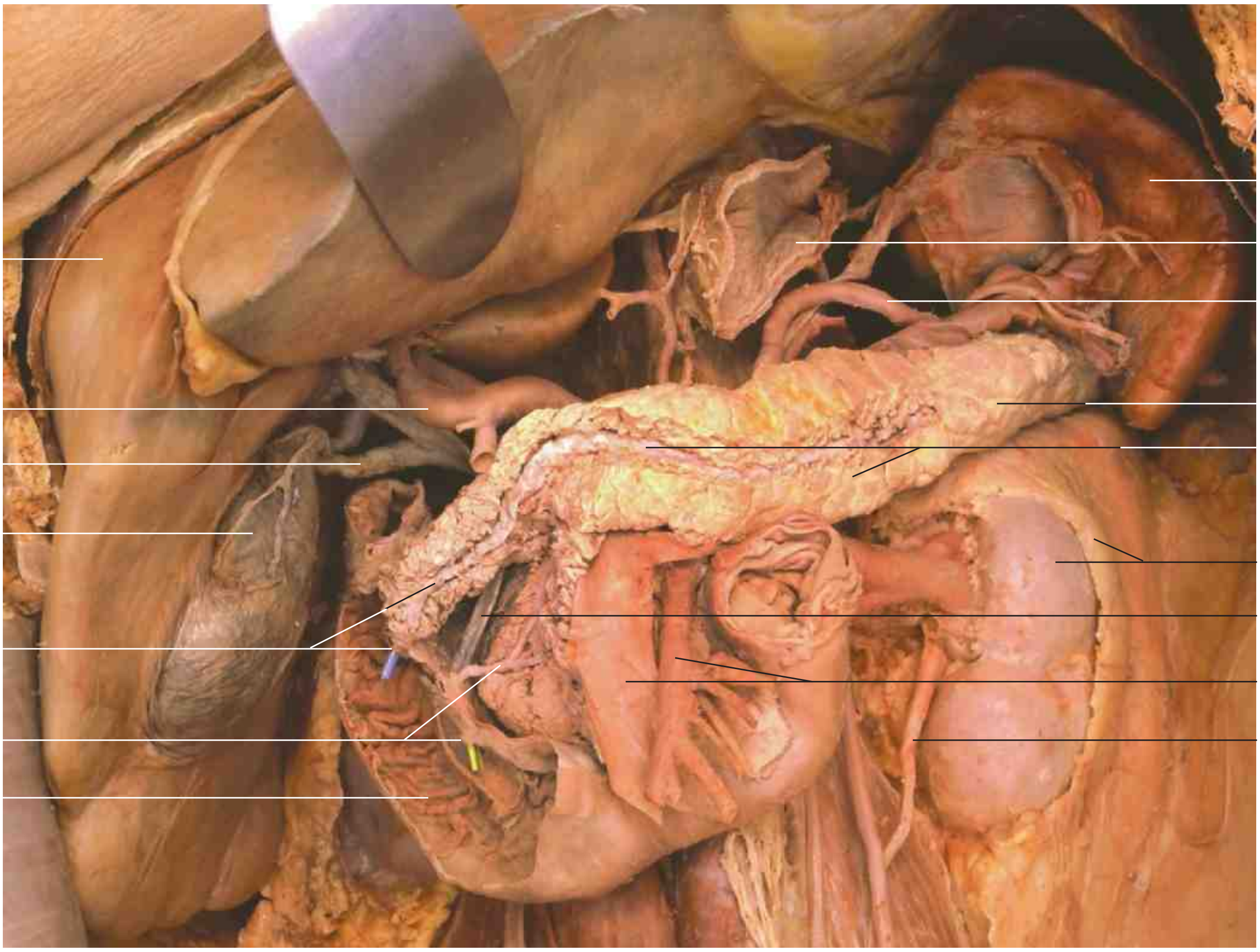


Location of the spleen in situ (left-lateral aspect). Intercostal spaces and diaphragm have been fenestrated.



Spleen (visceral surface), hilum of spleen with vessels, nerves, and ligaments.

1 Serratus anterior muscle
2 Left lung
3 Diaphragm
4 Spleen
5 External abdominal oblique muscle
6 Gastrosplenic ligament
7 Splenic artery
8 Pancreas tail
9 Superior margin of spleen
10 Anterior border of spleen
11 Liver
12 Hepatic artery proper
13 Cystic duct
14 Gallbladder
15 Lesser duodenal papilla (probe)
16 Greater duodenal papilla (probe)
17 Duodenum (fenestrated)
18 Cardia
19 Pancreas and pancreatic duct
20 Kidney (with capsula adiposa, capsular fat, adipose tissue)
21 Common bile duct
22 Superior mesenteric artery and vein
23 Ureter
24 Aorta with celiac trunk
25 Suprarenal gland
26 Inferior mesenteric vein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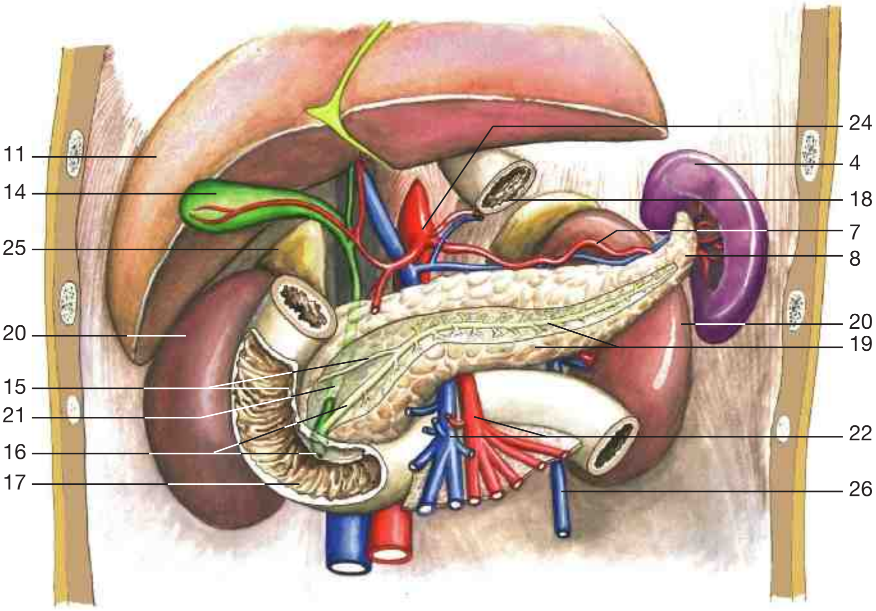
Upper abdominal organs (anterior aspect). Stomach and transverse colon have been removed, the duodenum fenestrated. The liver has been elevated to show the extrahepatic bile ducts. In this case the accessory pancreatic duct represents the main excretory duct of the pancreas.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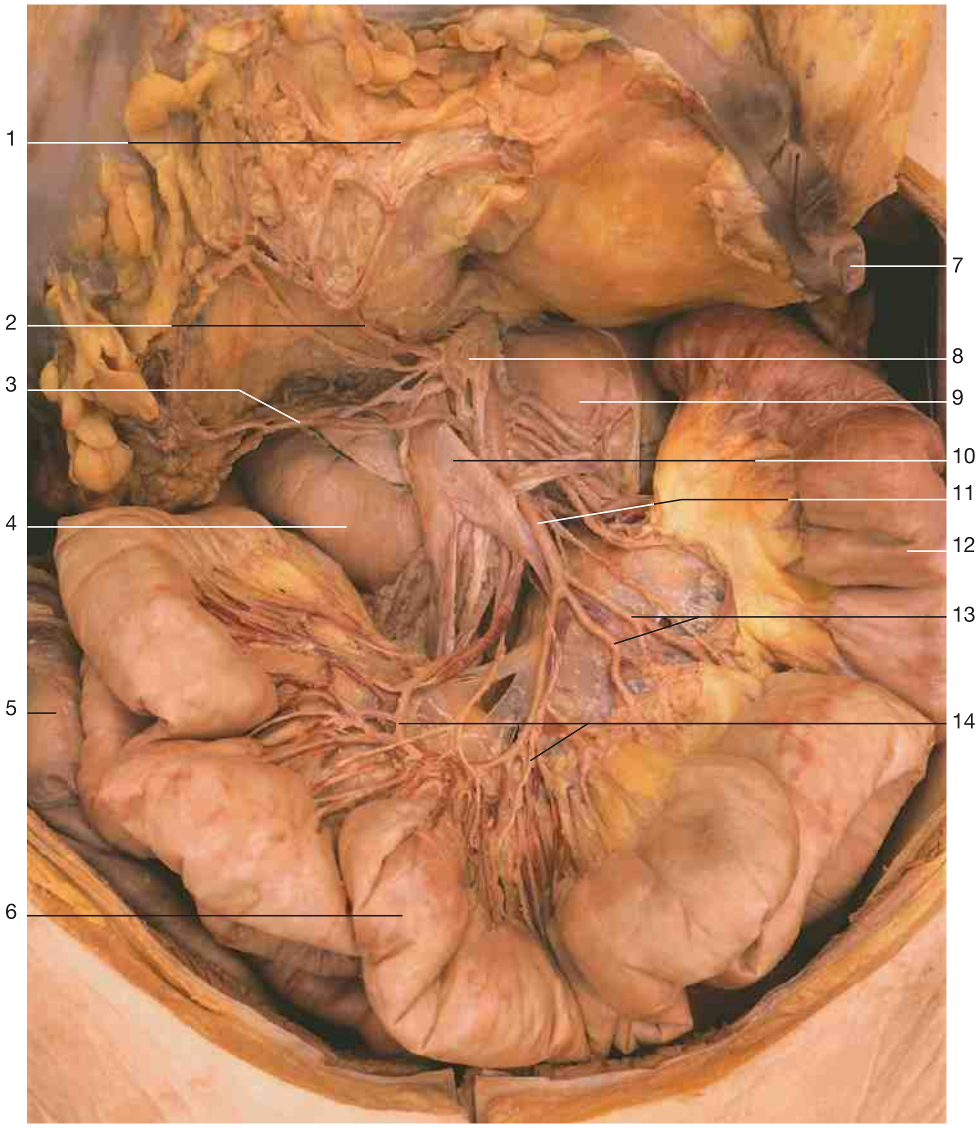
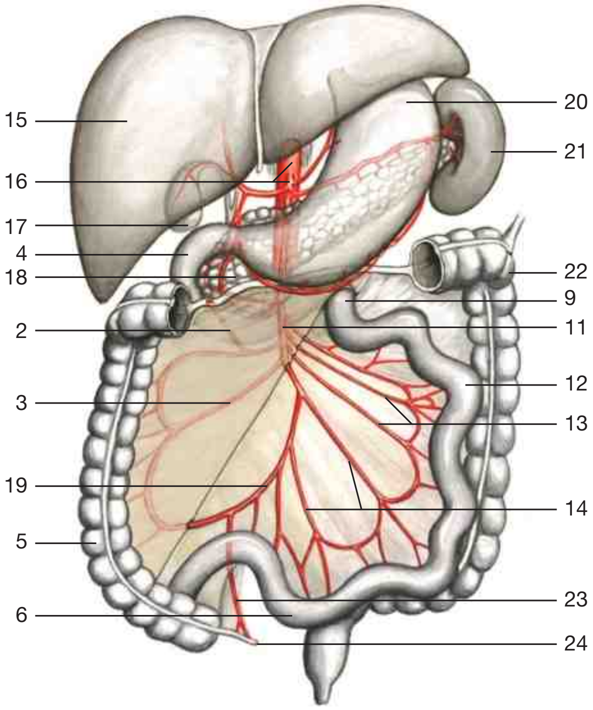
Upper abdominal organs (anterior aspect). The schematic drawing shows the most common situation of the pancreatic ducts.

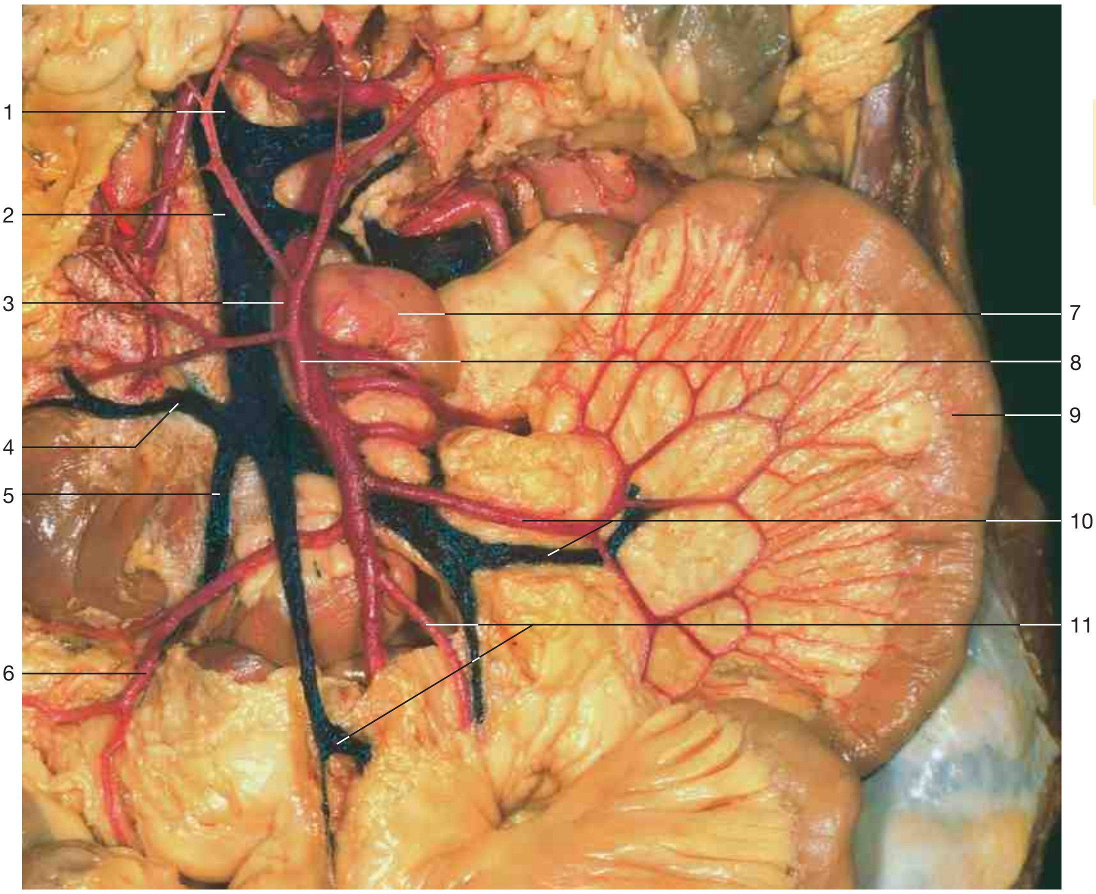


1 Greater omentum
2 Middle colic artery
3 Right colic artery
4 Duodenum
5 Ascending colon
6 Ileum
7 Transverse colon
8 Celiac ganglion
9 Duodenojejunal flexure
10 Superior mesenteric vein
11 Superior mesenteric artery
12 Jejunum
13 Jejunal arteries
14 Ileal arteries
15 Liver
16 Celiac trunk and abdominal aorta
17 Gallbladder
18 Pancreas
19 Ileocolic artery
20 Stomach
21 Spleen
22 Left colic flexure
23 Appendicular artery
24 Vermiform appendix

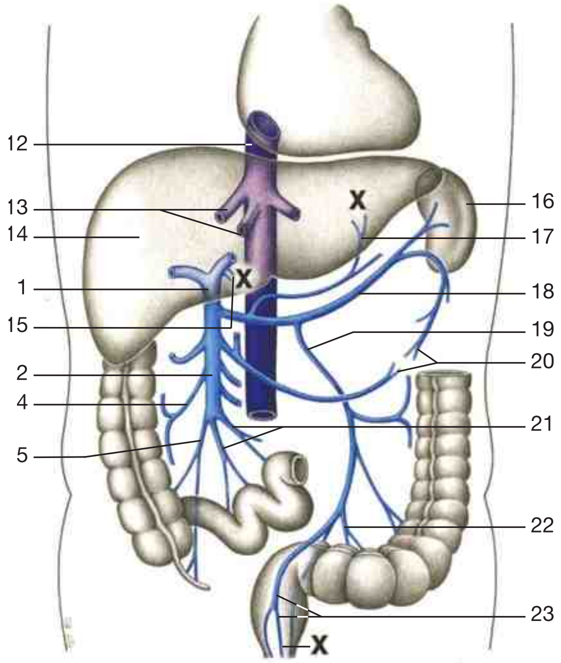
Vessels of abdominal organs, dissection of superior mesenteric artery and vein. Greater omentum and transverse colon are reflected.



Main branches of superior mesenteric artery (schematic drawing).

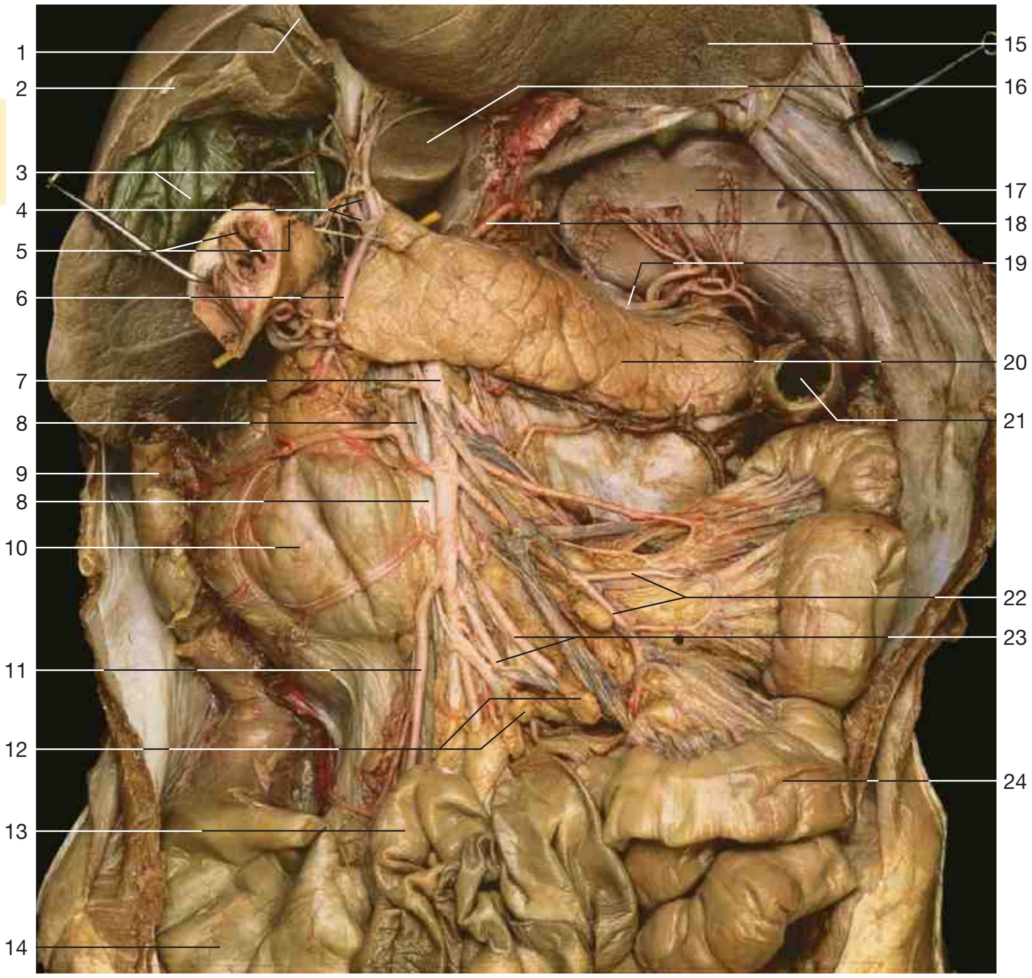


Tributaries of portal vein (blue) **and branches of superior mesenteric artery** (red) (anterior aspect).



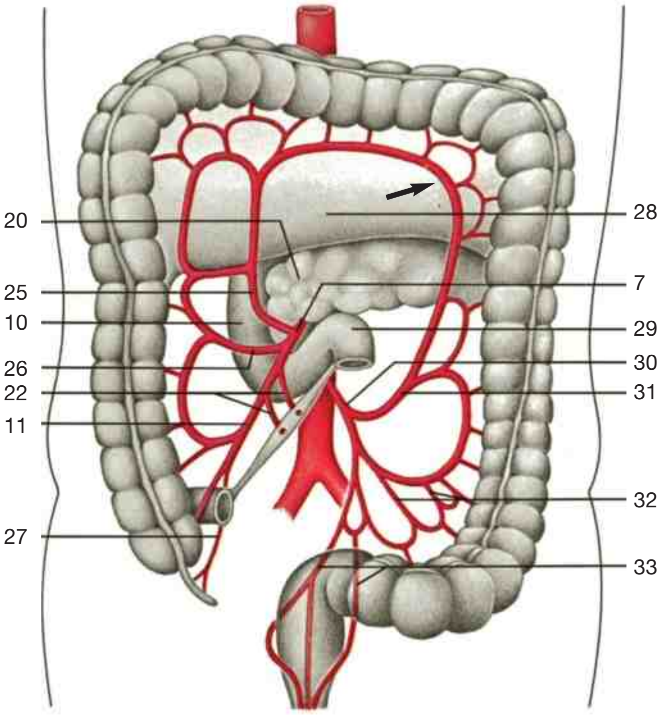
Main tributaries of portal vein (blue).
Inferior vena cava = violet; X = sites of portocaval anastomoses.

1 Portal vein
2 Superior mesenteric vein
3 Superior mesenteric artery
4 Right colic vein
5 Ileocolic vein
6 Ileocolic artery
7 Duodenojejunal flexure
8 Middle colic artery
9 Jejunum
10 Jejunal arteries and veins
11 Ileal arteries and veins
12 Inferior vena cava
13 Hepatic veins
14 Liver
15 Para-umbilical veins (located within the ligamentum teres)
16 Spleen
17 Left gastric vein with esophageal branches
18 Splenic vein
19 Inferior mesenteric vein
20 Gastro-omental veins
21 Ileal veins
22 Sigmoid veins
23 Superior rectal vein

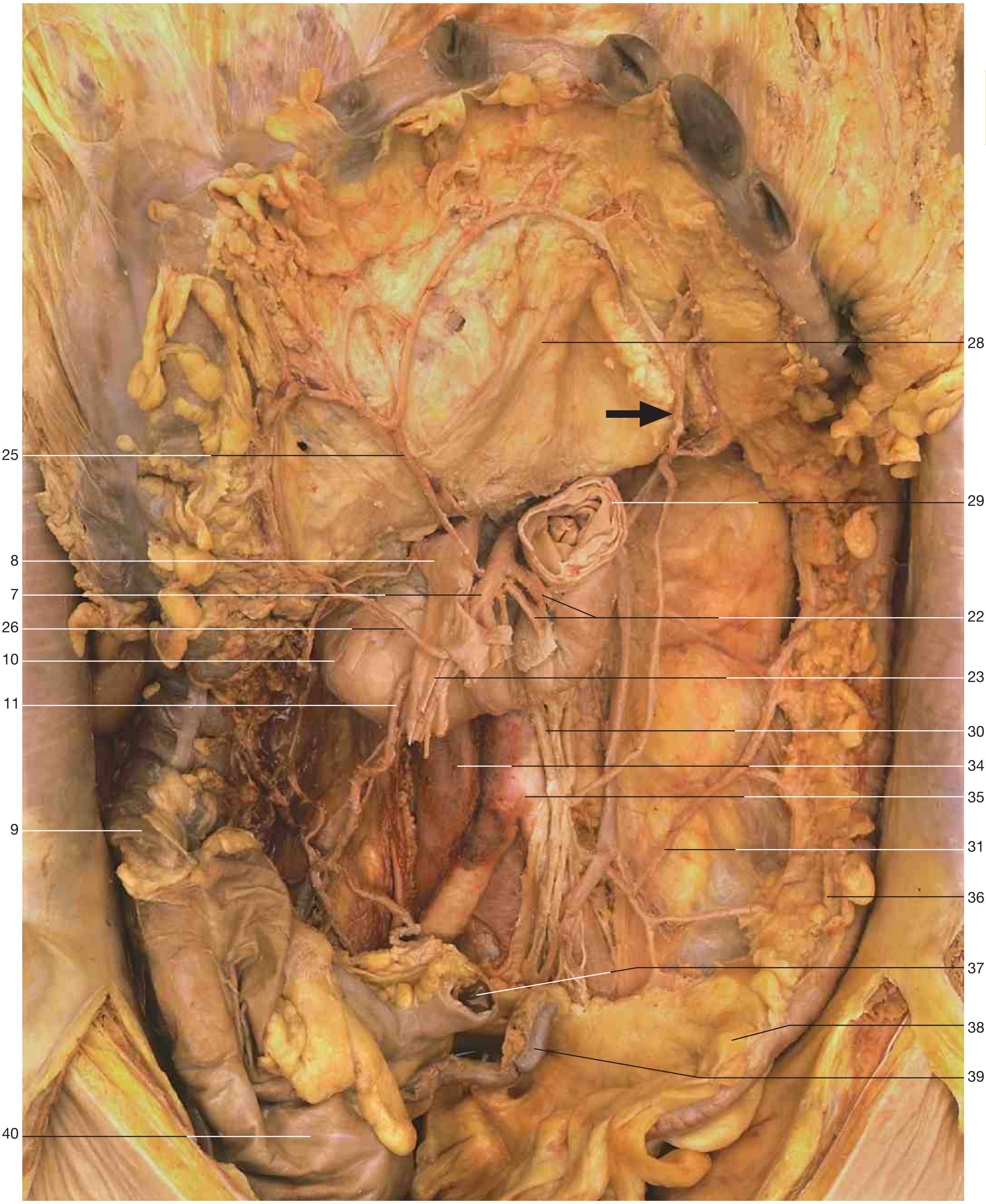


Superior mesenteric artery in relation to pancreas and duodenum. Stomach and transverse colon have been removed and the liver elevated. Note the location of the spleen. A yellow probe is inserted through the omental foramen.

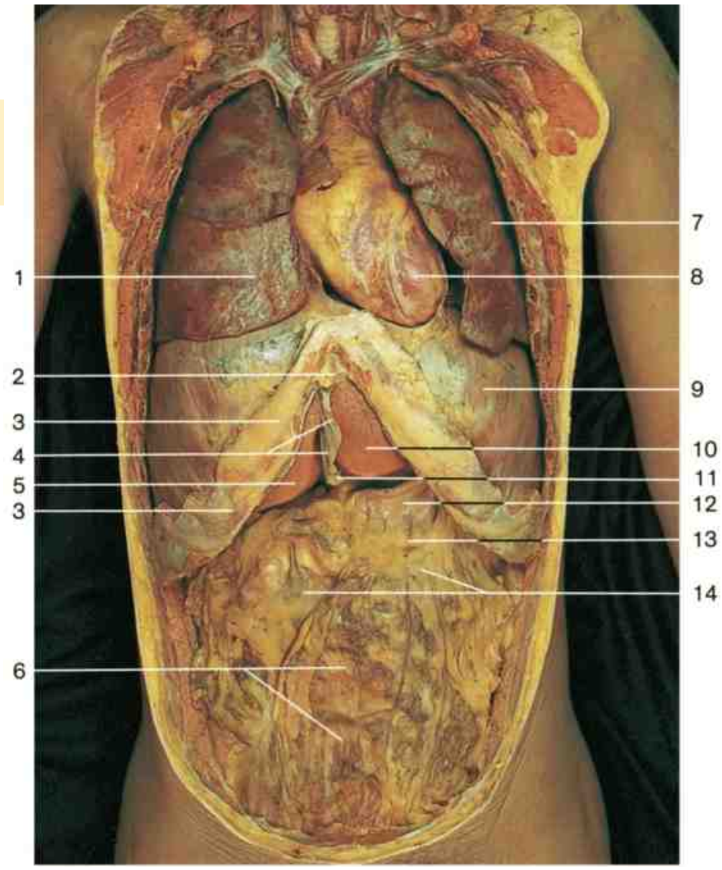
1	Ligamentum teres
2	Liver
3	Gallbladder and common bile duct
4	Hepatic artery proper and portal vein
5	Right gastric artery and pylorus
6	Gastroduodenal artery
7	Superior mesenteric artery
8	Superior mesenteric vein
9	Ascending colon
10	Duodenum
11	Ileocolic artery
12	Lymph nodes
13	Ileum
14	Cecum
15	Left lobe of liver
16	Caudate lobe of liver
17	Spleen
18	Left gastric artery
19	Splenic artery
20	Pancreas
21	Left colic flexure (cut)
22	Jejunal arteries
23	Ileal arteries
24	Jejunum
25	Middle colic artery
26	Right colic artery
27	Appendicular artery
28	Transverse mesocolon
29	Duodenojejunal flexure
30	Inferior mesenteric artery
31	Left colic artery
32	Sigmoid arteries
33	Superior rectal artery
34	Inferior vena cava
35	Abdominal aorta
36	Descending colon
37	Ileum
38	Sigmoid colon
39	Vermiform appendix
40	Cecum



Main branches of superior and inferior mesenteric arteries (schematic drawing). Arrow = Riolan's anastomosis.

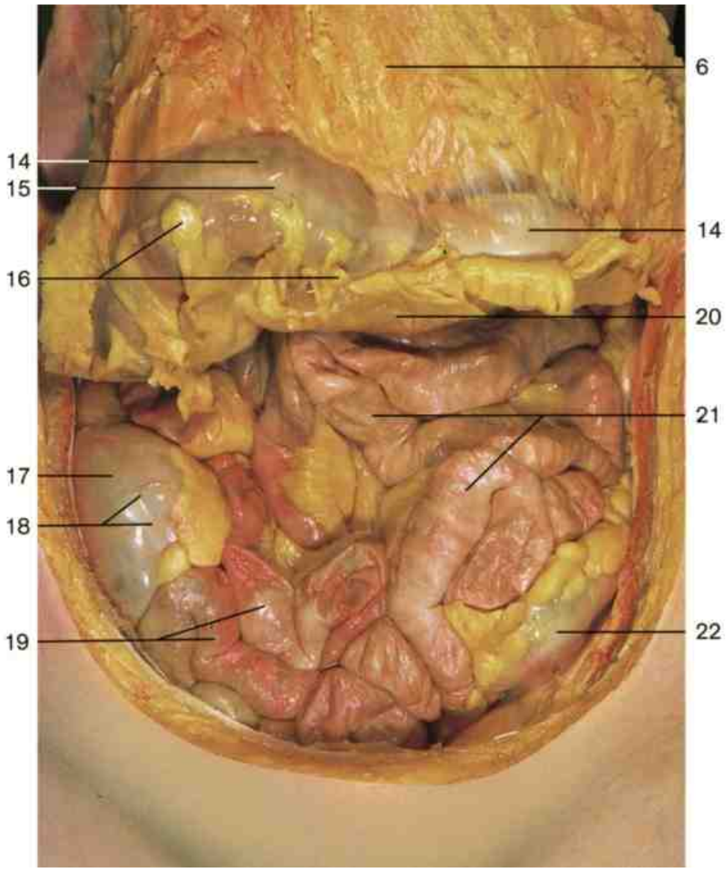


Vessels of the retroperitoneal organs. Direction of the inferior mesenteric artery and its anastomosis with the middle colic artery (arrow = Riolan's anastomosis). Greater omentum and transverse colon have been reflected, the intestine partly removed. The normally retrocecally located vermiform appendix has been replaced anteriorly. The right common iliac artery is partly obstructed by a blood thrombus.

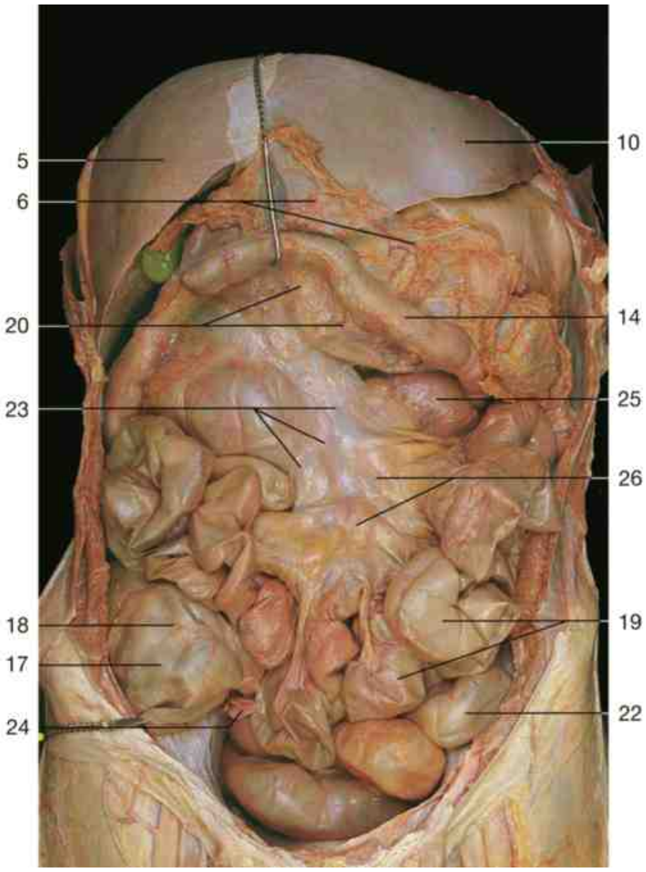


Abdominal organs. The anterior thoracic and abdominal walls have been removed.

1 Middle lobe of right lung
2 Xiphoid process
3 Costal margin
4 Falciform ligament of liver
5 Quadrate lobe of liver
6 Greater omentum
7 Upper lobe of left lung
8 Heart
9 Diaphragm
10 Left lobe of liver
11 Ligamentum teres
12 Stomach
13 Gastrocolic ligament
14 Transverse colon
15 Taenia coli
16 Appendices epiploicae
17 Cecum
18 Taenia coli
19 Ileum
20 Transverse mesocolon
21 Jejunum
22 Sigmoid colon
23 Position of root of mesentery
24 Vermiform appendix
25 Duodenojejunal flexure
26 Mesentery

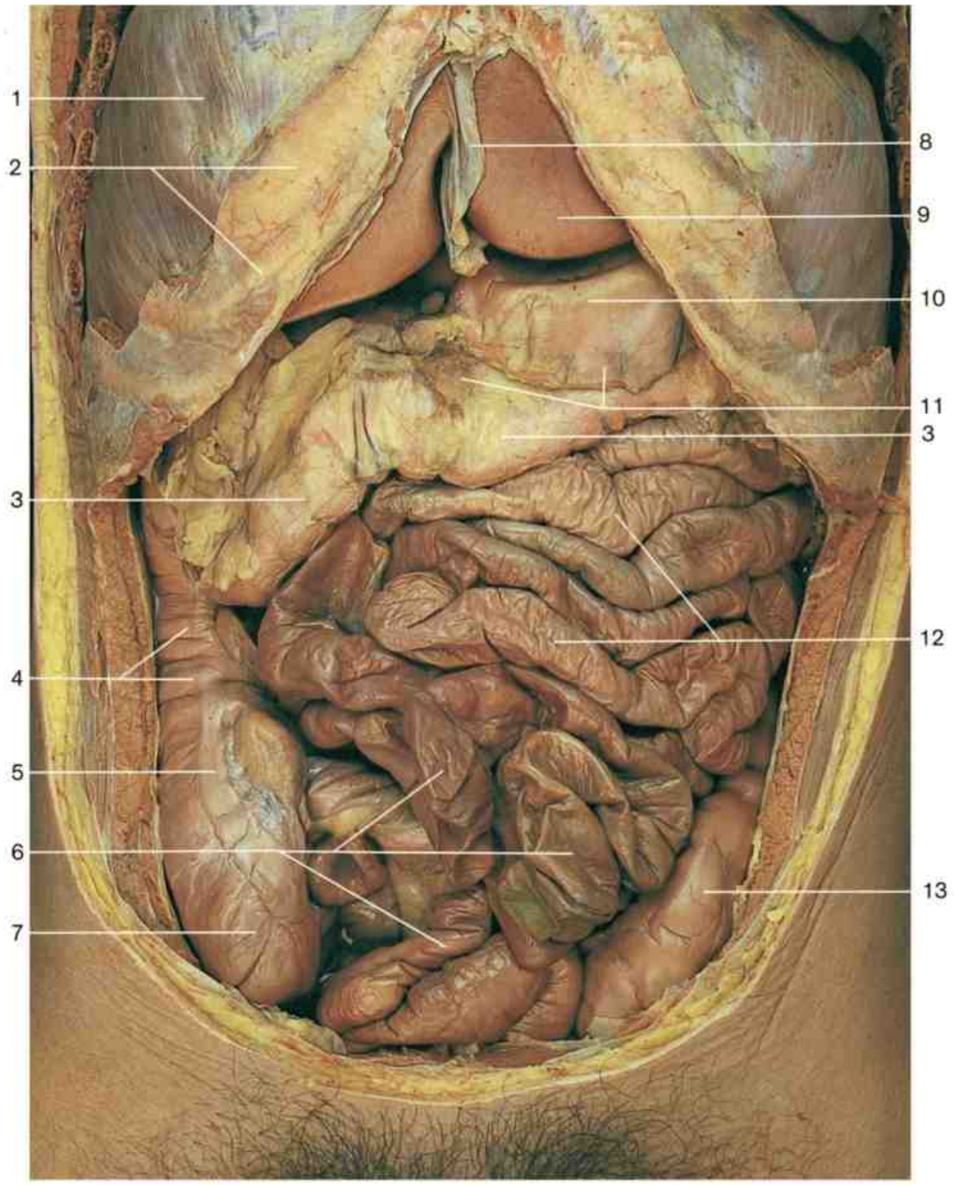


Abdominal organs (anterior aspect). The greater omentum, which is fixed to the transverse colon, has been raised.

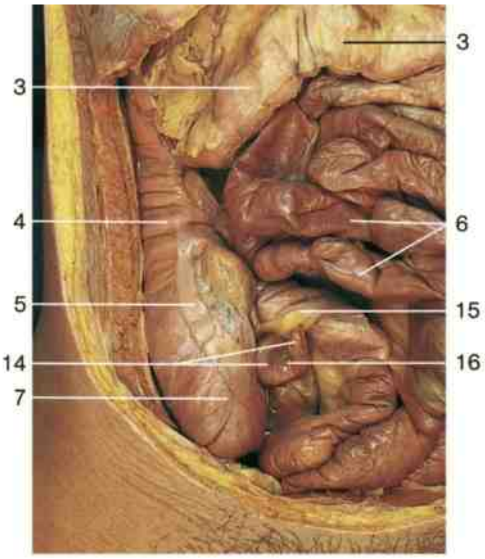


Abdominal organs (anterior aspect). The transverse colon has been reflected.

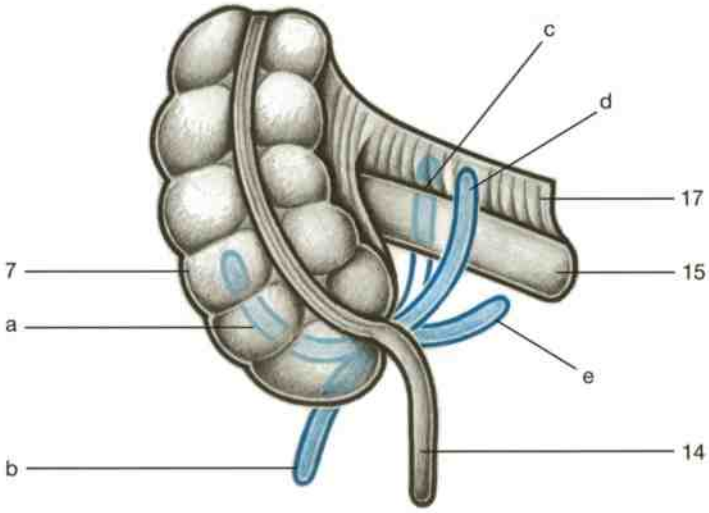
1	Diaphragm
2	Costal margin
3	Transverse colon
4	Ascending colon with haustra
5	Free taenia of cecum
6	Ileum
7	Cecum
8	Falciform ligament of liver
9	Liver
10	Stomach
11	Gastrocolic ligament
12	Jejunum
13	Sigmoid colon
14	Vermiform appendix
15	Terminal ileum
16	Meso-appendix
17	Mesentery



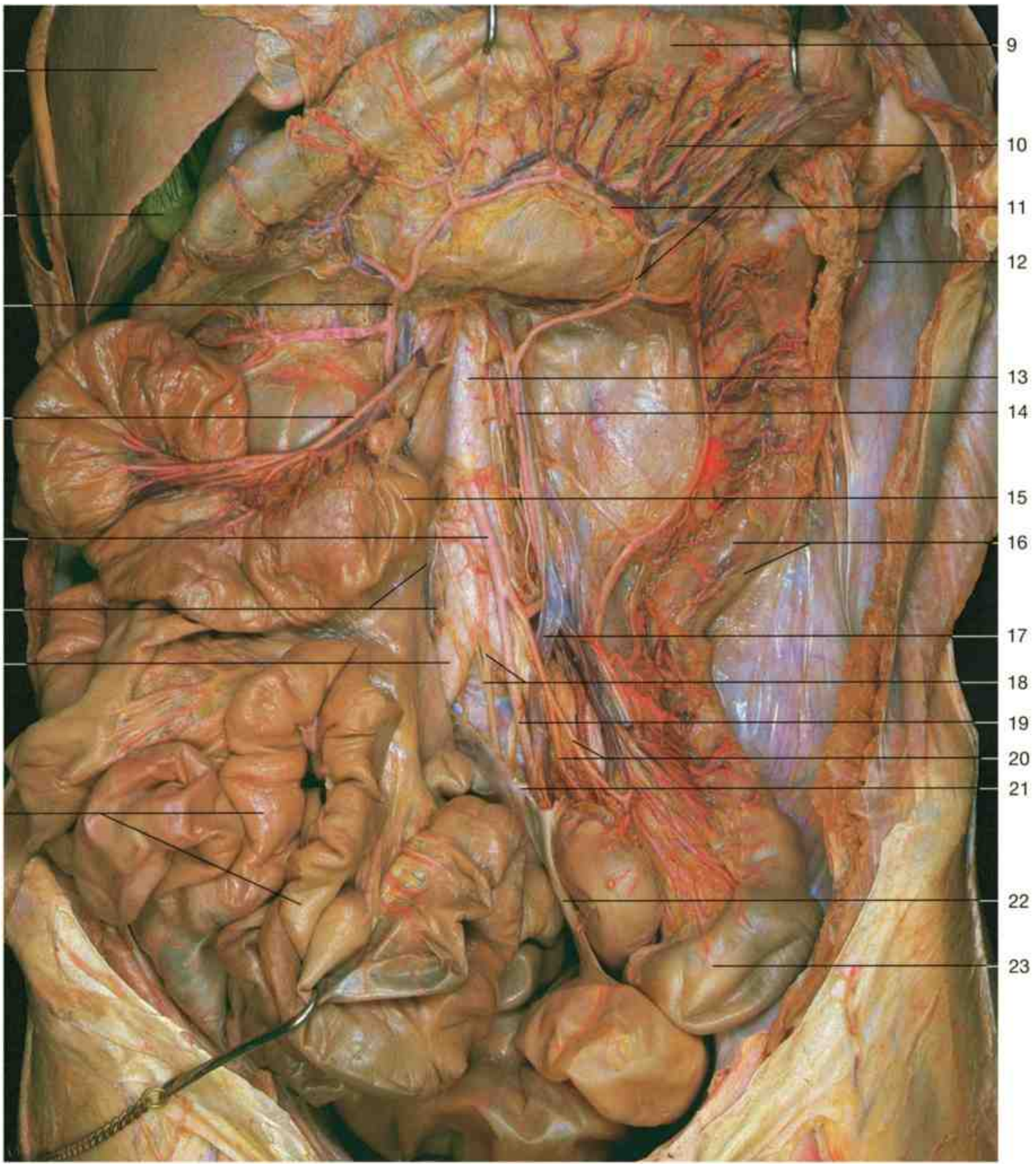
Abdominal organs in situ. The greater omentum has been removed.



Ascending colon, cecum, and vermiform appendix (detail of the preceding figure).

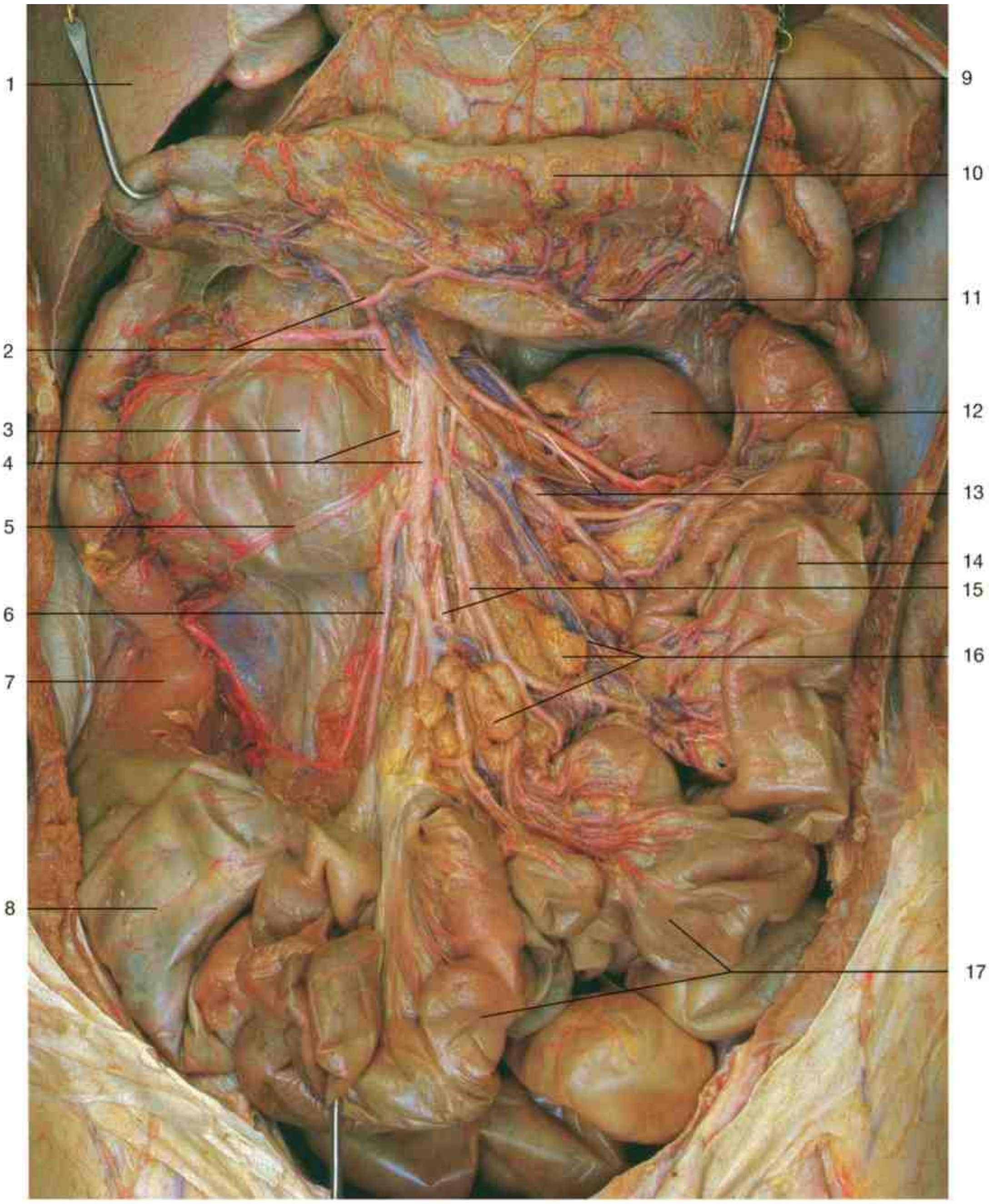


Variations in the position of the vermiform appendix. a = retrocecal; b = paracolic; c = retro-ileal; d = pre-ileal; e = subcecal.



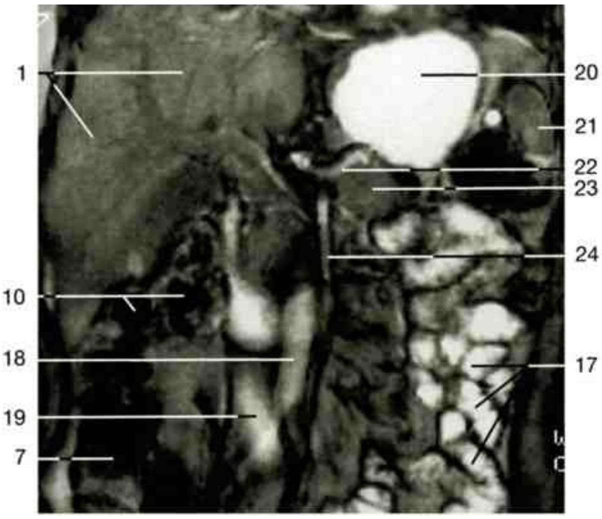
Abdominal organs. Dissection of inferior mesenteric artery and autonomic plexus. The transverse colon with mesocolon has been raised and the small intestine reflected.

1	Liver	12	Spleen
2	Gallbladder	13	Abdominal aorta
3	Middle colic artery	14	Left colic artery
4	Jejunal artery	15	Duodenojejunal flexure
5	Inferior mesenteric artery	16	Descending colon (free taenia of colon)
6	Sympathetic nerves and ganglia	17	Inferior mesenteric vein
7	Right common iliac artery	18	Superior hypogastric plexus
8	Small intestine (ileum)	19	Superior rectal artery
9	Transverse colon (reflected)	20	Sigmoid arteries
10	Transverse mesocolon	21	Peritoneum (cut edge)
11	Anastomosis between middle and left colic artery	22	Sigmoid mesocolon
		23	Sigmoid colon

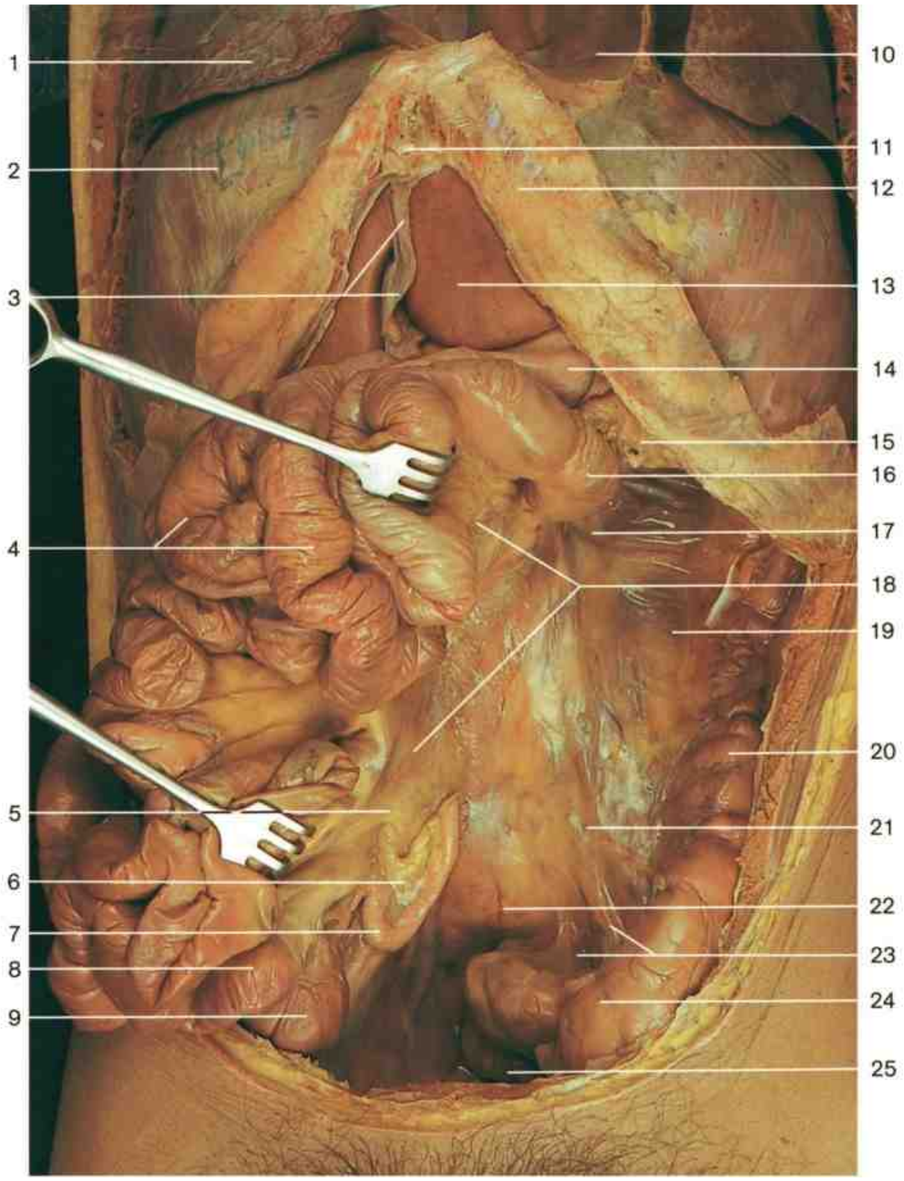


1 Liver
2 Middle colic artery
3 Horizontal part of duodenum (extended)
4 Superior mesenteric artery and vein
5 Right colic artery
6 Ileocolic artery
7 Ascending colon
8 Cecum
9 Greater omentum (reflected)
10 Transverse colon
11 Transverse mesocolon
12 Duodenojejunal flexure
13 Jejunal arteries
14 Jejunum
15 Ileal arteries
16 Mesenteric lymph nodes and lymph vessels
17 Ileum
18 Abdominal aorta
19 Inferior vena cava
20 Stomach
21 Spleen
22 Splenic artery
23 Head of pancreas
24 Superior mesenteric artery

Abdominal organs. Superior mesenteric artery. Mesenteric lymph nodes. Transverse colon reflected.

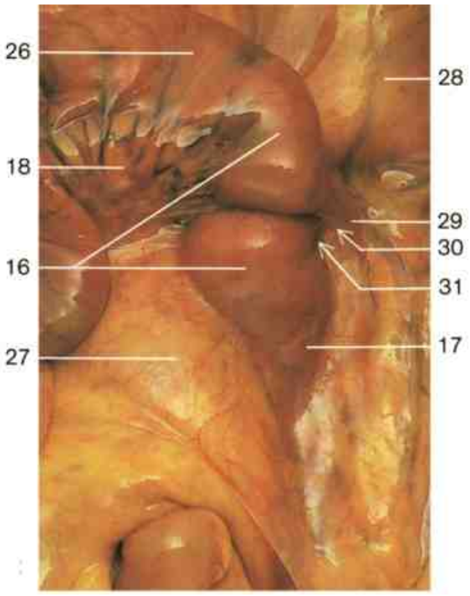


Frontal section through the abdominal cavity (MRI scan; the intestinal tract and vessels are filled with a paramagnetic substance [Gadolinium]; courtesy of Dr. W. Rödl, Erlangen, Germany).

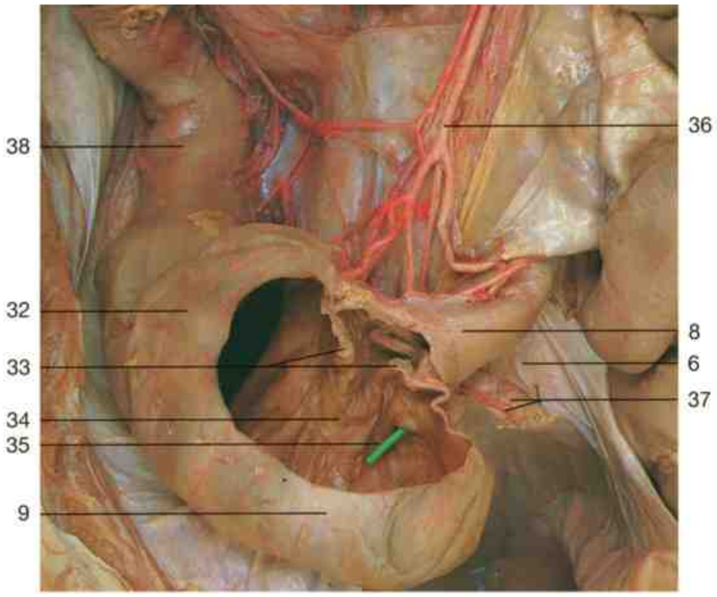


Abdominal cavity. Mesenteries. The small intestine has been reflected laterally to demonstrate the mesentery.

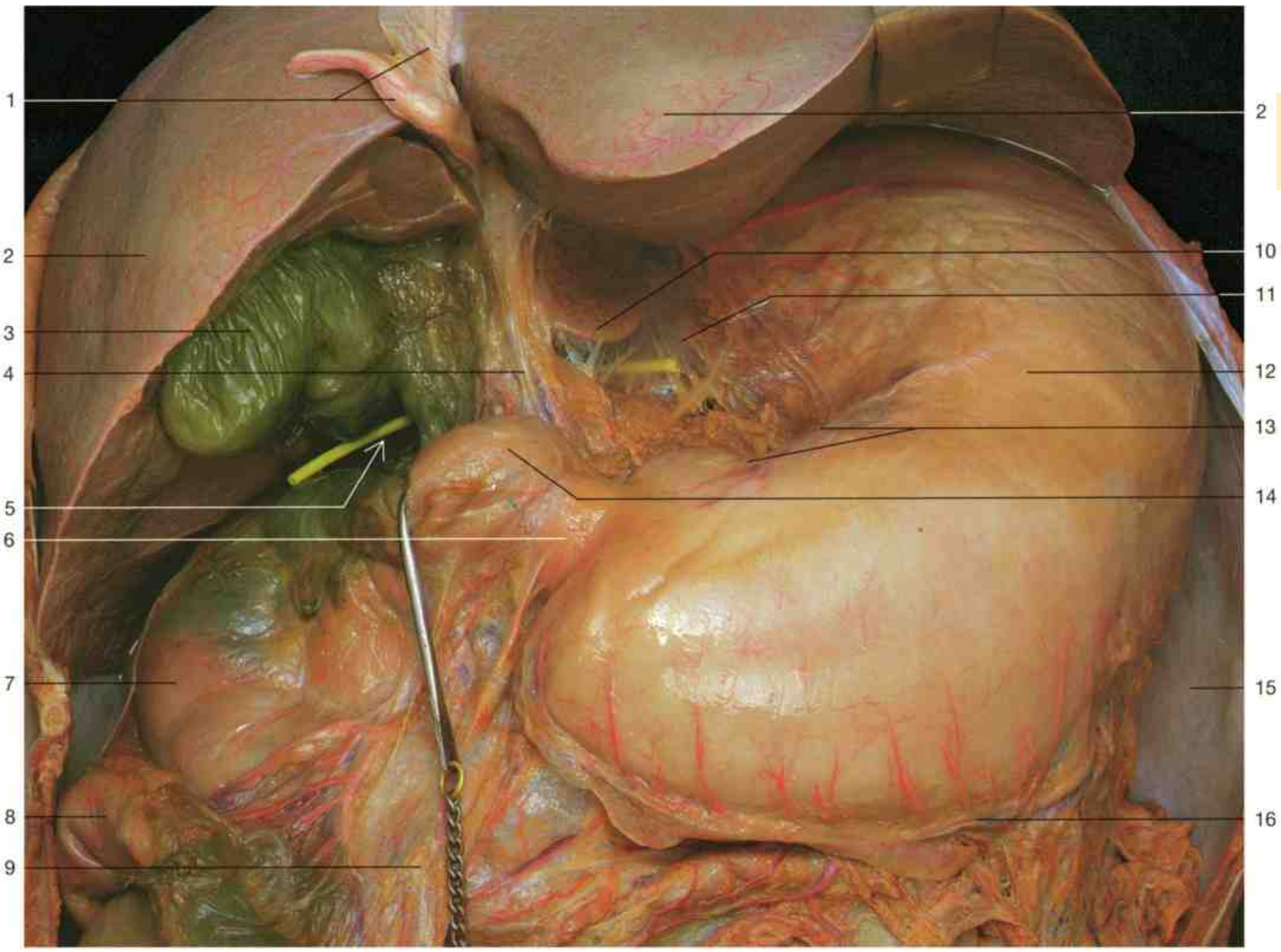
1	Lung
2	Diaphragm
3	Falciform ligament of liver
4	Jejunum
5	Ileocecal fold
6	Meso-appendix
7	Vermiform appendix
8	Ileocecal junction
9	Cecum
10	Pericardial sac
11	Xiphoid process
12	Costal margin
13	Liver
14	Stomach
15	Transverse colon
16	Duodenojejunal flexure
17	Inferior duodenal fold
18	Mesentery
19	Position of left kidney
20	Descending colon
21	Position of left common iliac artery
22	Sacral promontory
23	Sigmoid mesocolon
24	Sigmoid colon
25	Rectum
26	Beginning of jejunum
27	Peritoneum of posterior abdominal wall
28	Transverse mesocolon
29	Superior duodenal fold
30	Superior duodenal recess
31	Retroduodenal recess
32	Free taenia of ascending colon
33	Ileocecal valve
34	Frenulum of ileocecal valve
35	Orifice of vermiform appendix (probe)
36	Ileocolic artery
37	Vermiform appendix with appendicular artery
38	Ascending colon



Duodenojejunal flexure (enlargement of preceding figure).

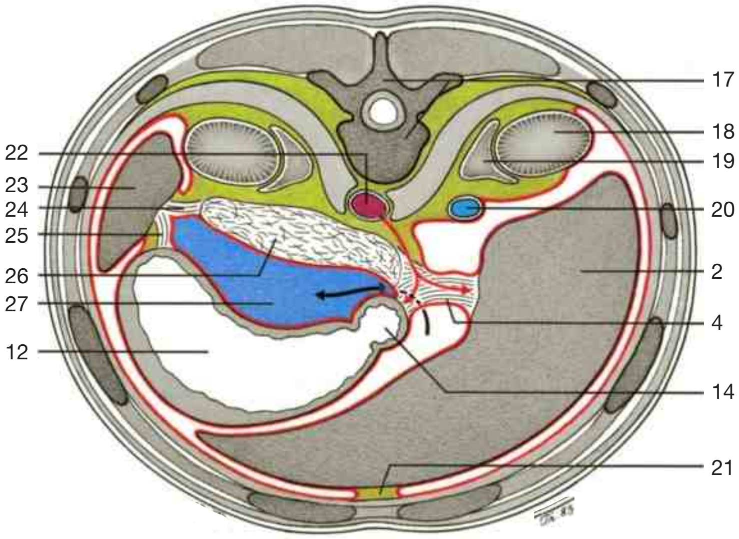


Ileocecal valve (ventral aspect). The cecum and terminal part of the ileum have been opened.

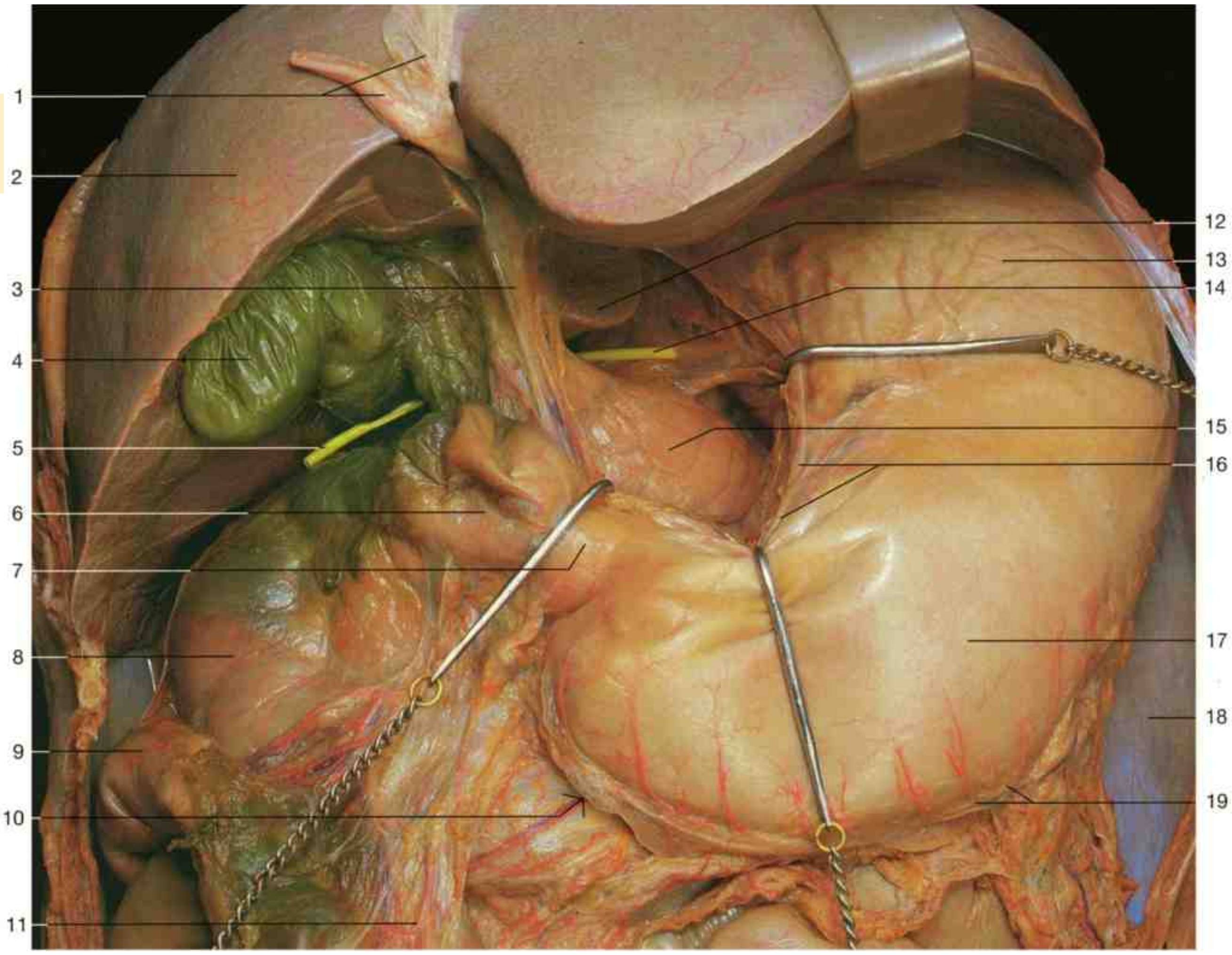


Upper abdominal organs (anterior aspect). Thorax and anterior part of diaphragm have been removed and the liver raised to display the lesser omentum. A probe has been inserted into the epiploic foramen and lesser sac.

1 Falciform ligament and ligamentum teres
2 Liver
3 Gallbladder (fundus)
4 Hepatoduodenal ligament
5 Epiploic foramen (probe)
6 Pylorus
7 Descending part of duodenum
8 Right colic flexure
9 Gastrocolic ligament
10 Caudate lobe of liver (behind lesser omentum)
11 Lesser omentum
12 Stomach
13 Lesser curvature of stomach
14 Superior part of duodenum
15 Diaphragm
16 Greater curvature of stomach with gastro-omental vessels
17 Twelfth thoracic vertebra
18 Right kidney
19 Right suprarenal gland
20 Inferior vena cava
21 Falciform ligament of liver
22 Abdominal aorta
23 Spleen
24 Lienorenal ligament
25 Gastrosplenic ligament
26 Pancreas
27 Lesser sac (omental bursa)

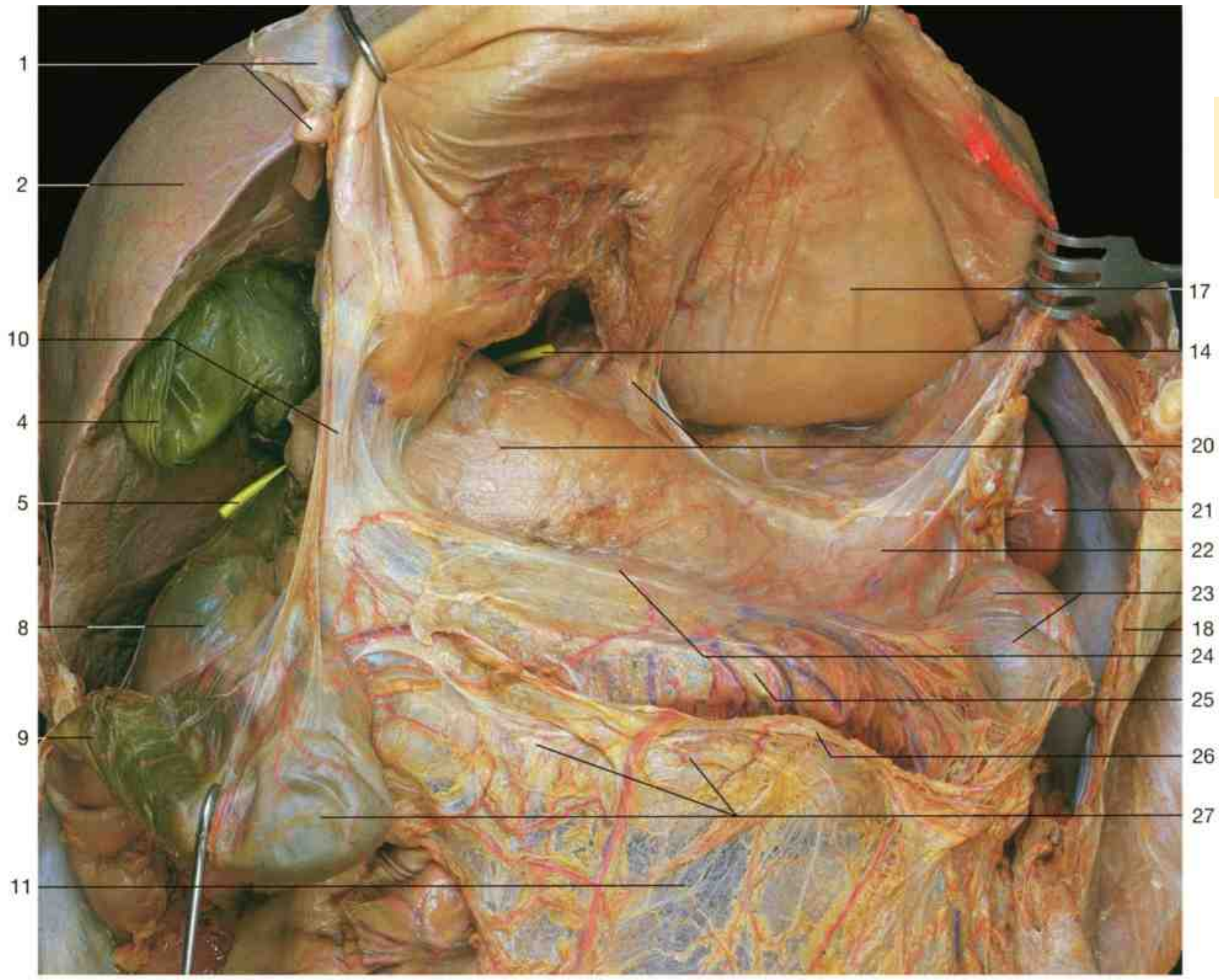


Horizontal section through the lesser sac above the level of epiploic foramen (black arrow). Viewed from above. Red arrows: routes of the arterial branches of celiac trunk to liver, stomach, duodenum, and pancreas (posterior aspect).



Upper abdominal organs (anterior aspect). **Lesser sac.** Lesser omentum partly removed, liver and stomach slightly reflected.

1 Falciform ligament and ligamentum teres
2 Liver
3 Hepatoduodenal ligament
4 Gallbladder
5 Probe within the epiploic foramen
6 Superior part of duodenum
7 Pylorus
8 Descending part of duodenum
9 Right colic flexure
10 Gastrocolic ligament
11 Greater omentum
12 Caudate lobe of liver
13 Fundus of stomach
14 Probe at the level of the vestibule of lesser sac (through epiploic foramen)
15 Head of pancreas
16 Lesser curvature of stomach
17 Body of stomach
18 Diaphragm
19 Greater curvature with gastro-omental vessels
20 Head of pancreas and gastropancreatic fold
21 Spleen
22 Tail of pancreas
23 Left colic flexure
24 Root of transverse mesocolon
25 Transverse mesocolon
26 Gastrocolic ligament (cut edge)
27 Transverse colon
28 Umbilicus
29 Small intestine
30 Lesser omentum
31 Lesser sac (omental bursa)
32 Duodenum
33 Mesentery
34 Sigmoid colon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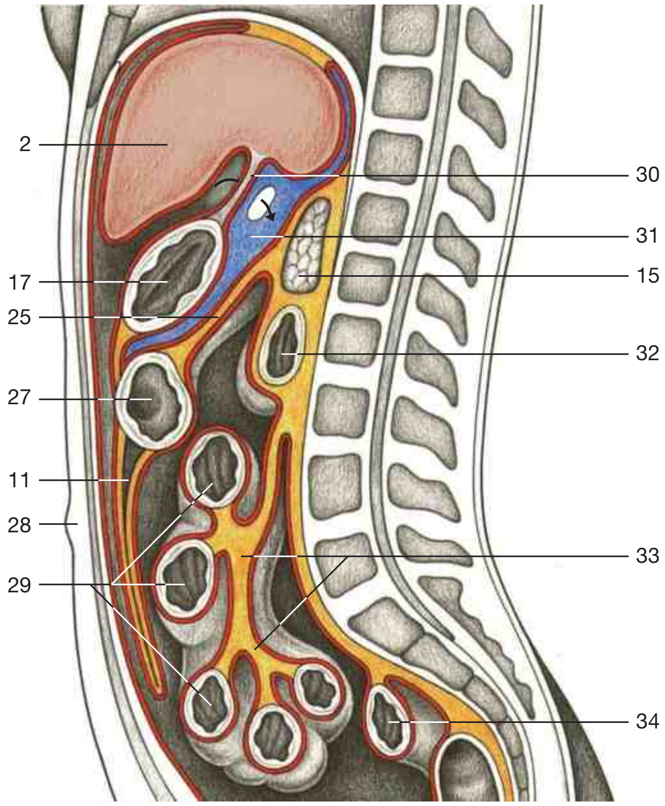
Upper abdominal organs (anterior aspect). **Lesser sac.** The gastrocolic ligament has been divided and the whole stomach raised to display the posterior wall of the lesser sac.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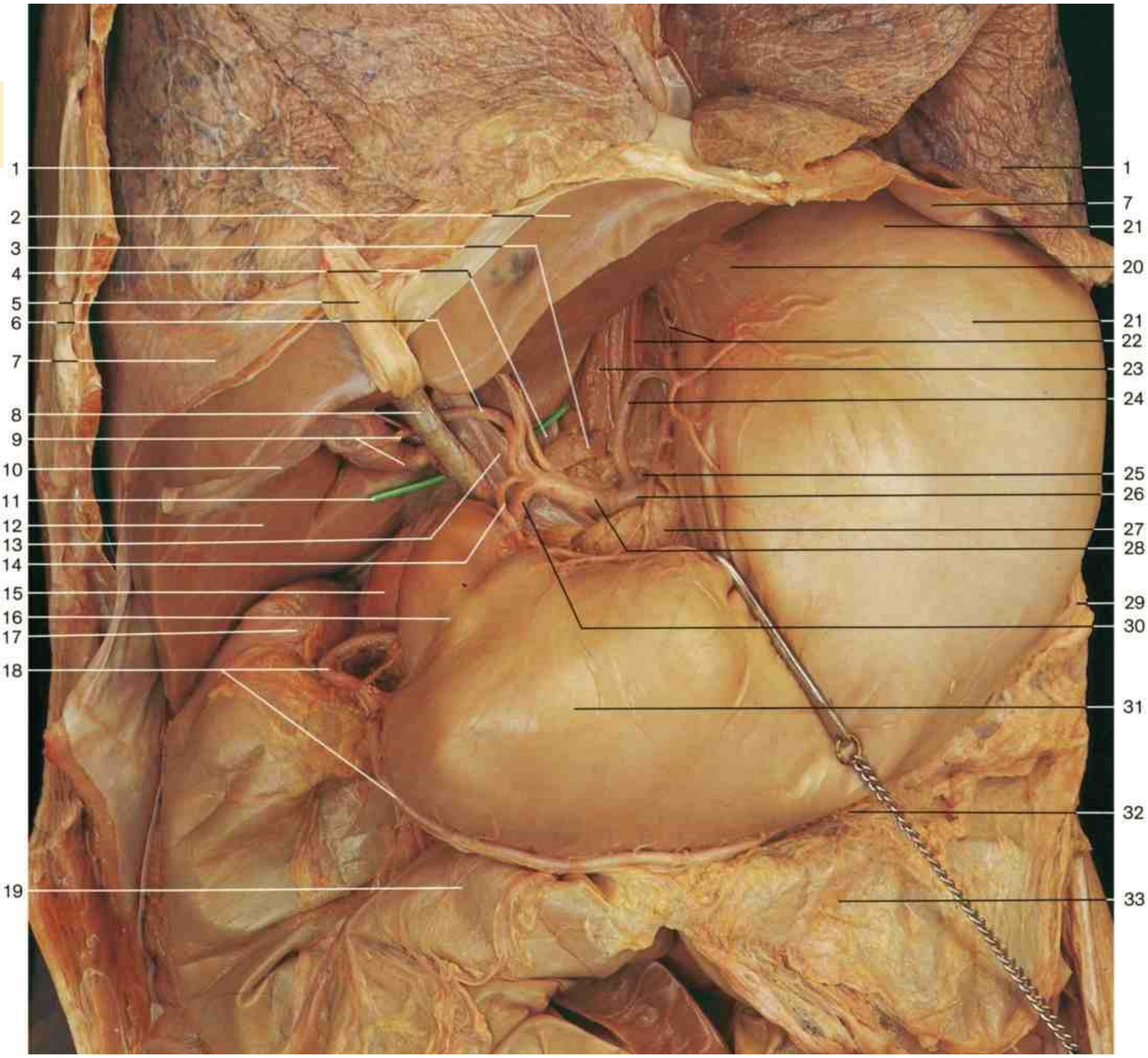
Midsagittal section through abdominal cavity, demonstrating the site of lesser sac (blue). (Schematic drawing.) The epiploic foramen, entrance to the lesser sac, is indicated by an arrow. Red = peritoneum.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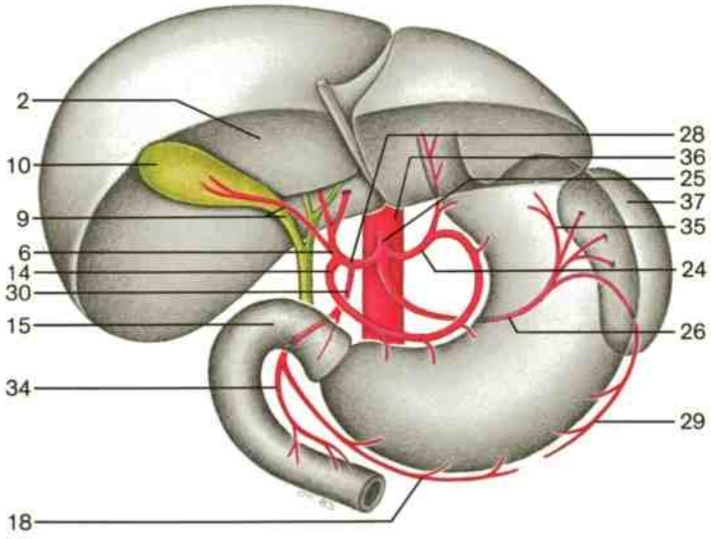
Arteries of upper abdominal organs (anterior aspect). **Dissection of celiac trunk.** The lesser omentum has been removed and the lesser curvature of the stomach reflected to display the branches of the celiac trunk. The probe is situated within the epiploic foramen.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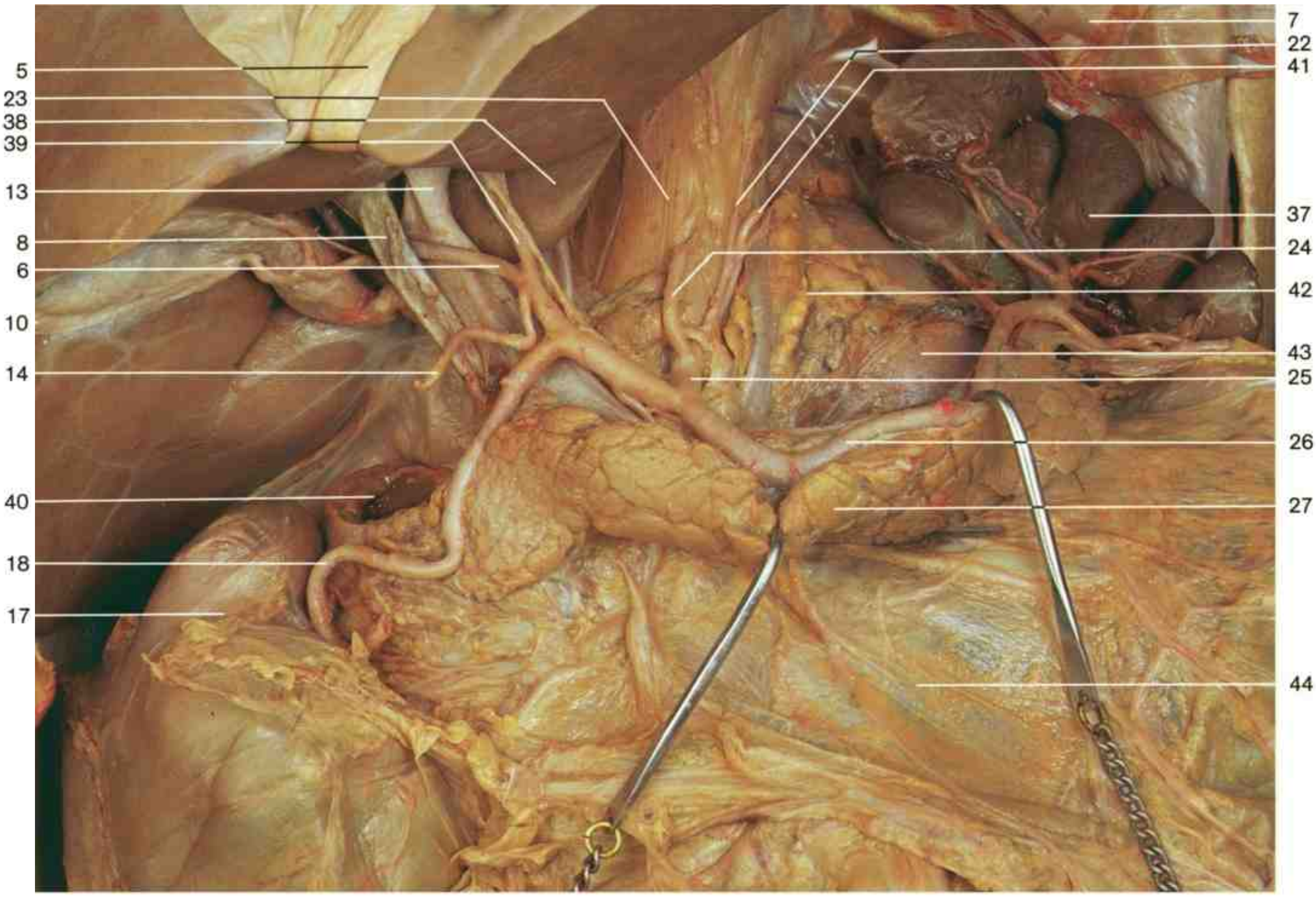
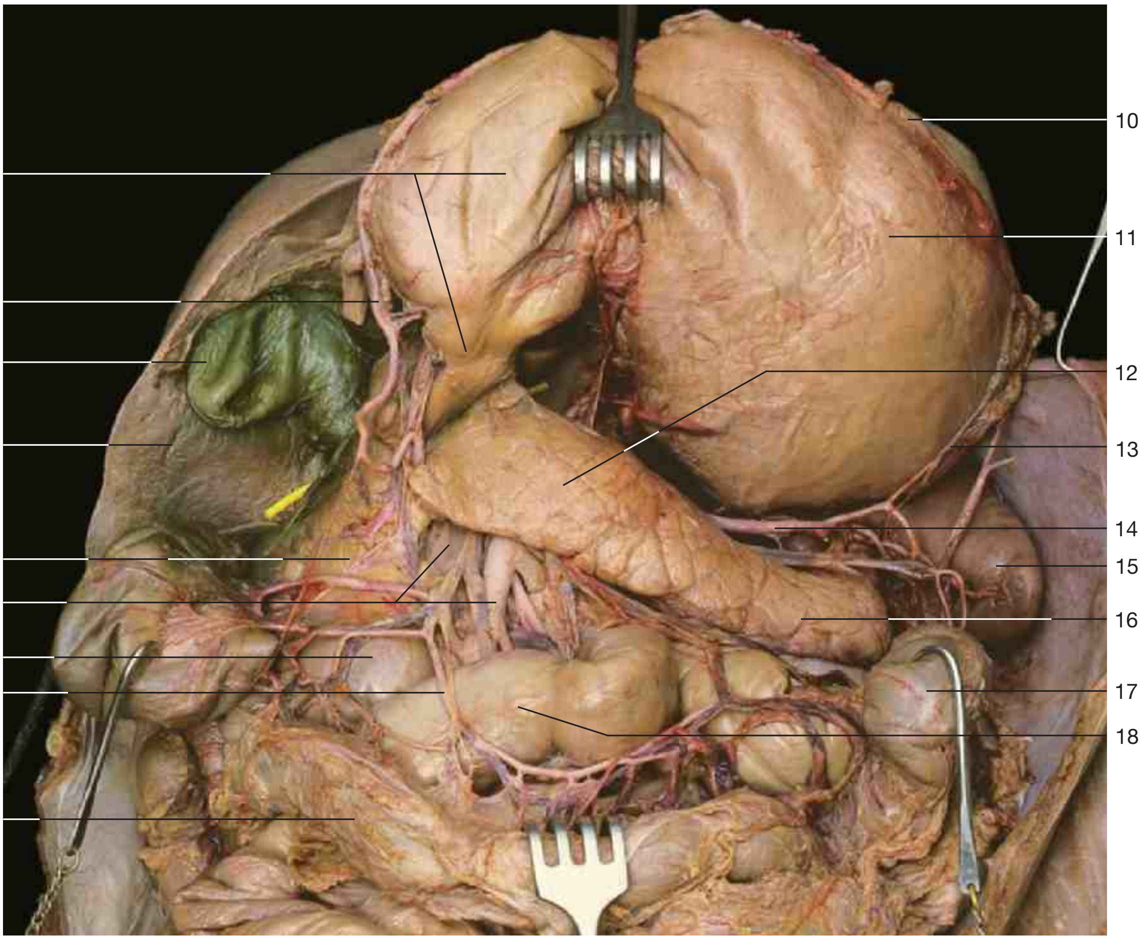
Branches of celiac trunk (schematic drawing).

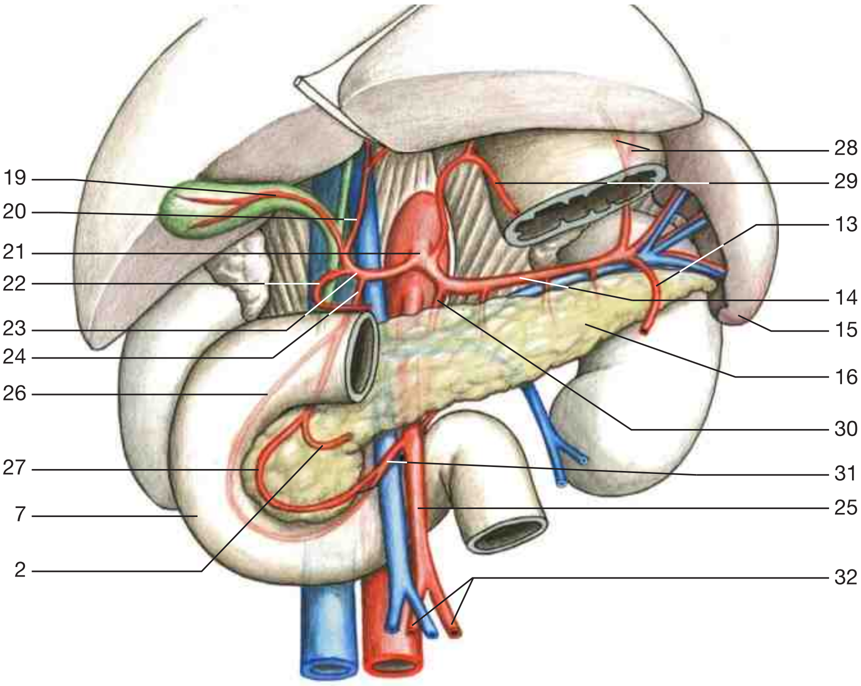


Arteries of upper abdominal organs (anterior aspect). **Branches of celiac trunk; blood supply of liver, pancreas, and spleen.** The stomach, superior part of duodenum, and celiac ganglion have been removed to reveal the anterior aspect of the posterior wall of the lesser sac (omental bursa) and the vessels and ducts of the hepatoduodenal ligament. The pancreas has been slightly reflected anteriorly.

1	Lung
2	Liver (visceral surface)
3	Lymph node
4	Inferior vena cava
5	Ligamentum teres (reflected)
6	Right branch of hepatic artery proper
7	Diaphragm
8	Common hepatic duct (dilated)
9	Cystic duct and artery
10	Gallbladder
11	Probe in epiploic foramen
12	Right lobe of liver
13	Portal vein
14	Right gastric artery
15	Duodenum
16	Pylorus
17	Right colic flexure
18	Right gastro-omental (gastro-epiploic) artery
19	Transverse colon
20	Abdominal part of esophagus (cardiac part of stomach)
21	Fundus of stomach
22	Esophageal branches of left gastric artery
23	Lumbar part of diaphragm
24	Left gastric artery
25	Celiac trunk
26	Splenic artery
27	Pancreas
28	Common hepatic artery
29	Left gastro-omental (gastro-epiploic) artery
30	Gastroduodenal artery
31	Pyloric part of stomach
32	Greater curvature of stomach
33	Gastrocolic ligament
34	Superior pancreaticoduodenal artery
35	Short gastric arteries
36	Aorta
37	Spleen
38	Caudate lobe of liver
39	Left branch of hepatic artery proper
40	Descending part of duodenum (cut)
41	Left inferior phrenic artery
42	Suprarenal gland
43	Kidney
44	Transverse mesocolon

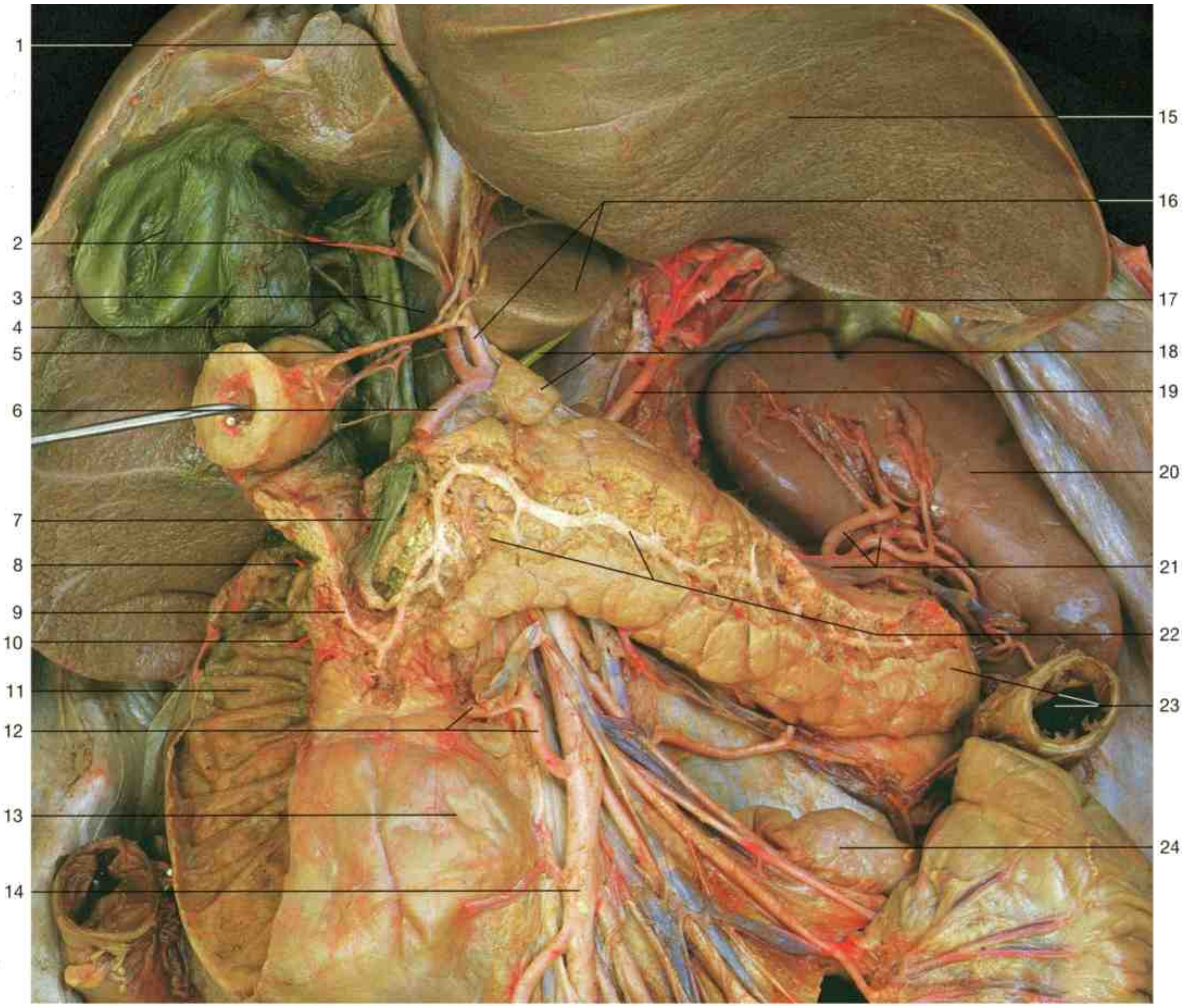


Posterior abdominal wall with pancreas and extrahepatic bile ducts in situ (anterior aspect). The gastrocolic ligament has been divided, the transverse colon and the stomach replaced to display the pancreas and superior mesenteric vessels.



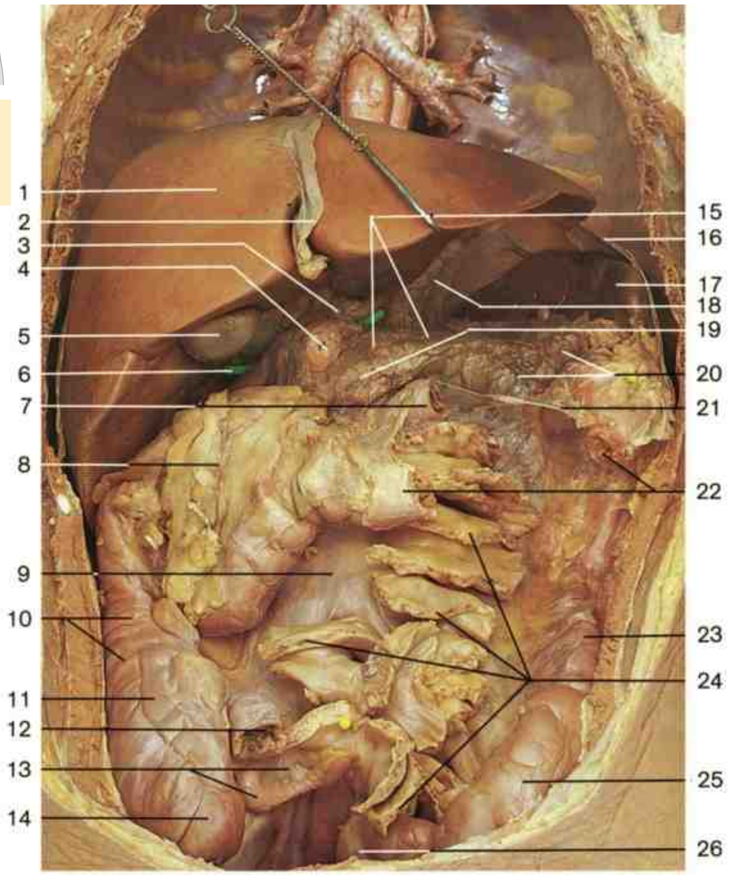
Blood supply of upper abdominal organs (branches of the celiac trunk and superior mesenteric artery). (Schematic drawing.)

1	Stomach (pyloric part) and pylorus
2	Right gastro-omental (gastro-epiploic) artery
3	Fundus of gallbladder
4	Liver (right lobe)
5	Head of pancreas
6	Superior mesenteric artery and vein
7	Duodenum
8	Middle colic artery
9	Transverse colon
10	Greater curvature of stomach (remnants of gastrocolic ligament)
11	Body of stomach
12	Body of pancreas
13	Left gastro-omental (gastro-epiploic) artery
14	Splenic artery
15	Spleen
16	Tail of pancreas
17	Left colic flexure
18	Jejunum
19	Cystic artery
20	Hepatic artery proper
21	Celiac trunk
22	Right gastric artery
23	Common hepatic artery
24	Gastroduodenal artery
25	Superior mesenteric artery
26	Superior posterior pancreaticoduodenal artery
27	Superior anterior pancreaticoduodenal artery
28	Short gastric arteries
29	Left gastric artery
30	Posterior pancreatic branch of splenic artery
31	Inferior pancreaticoduodenal artery
32	Jejunal arteries



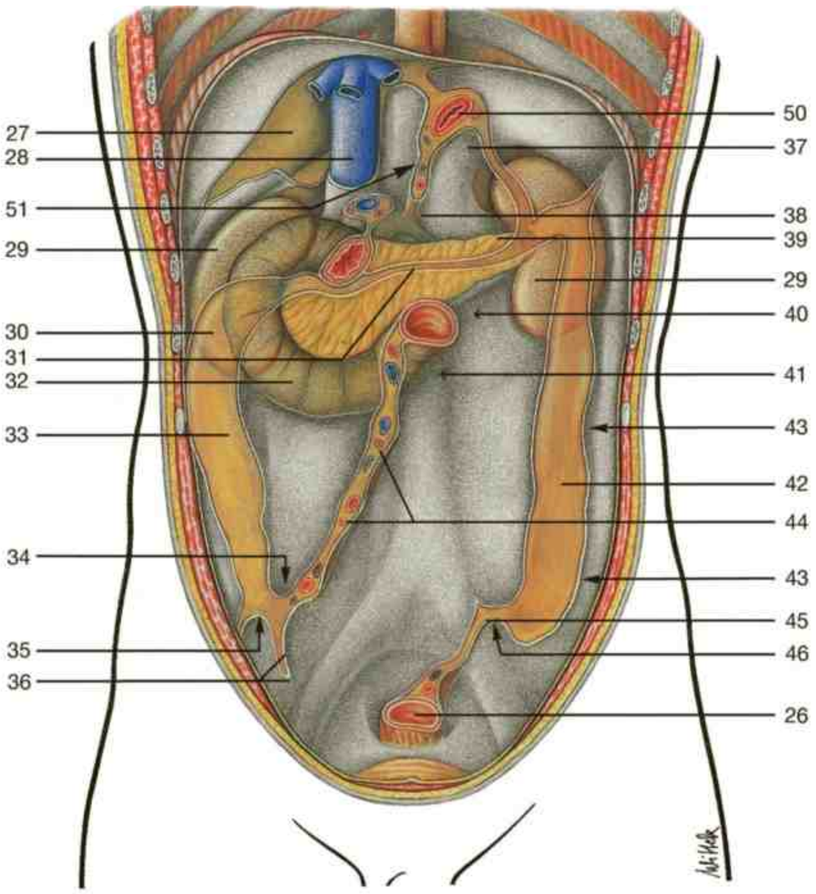
Posterior abdominal wall with duodenum, pancreas, and spleen (anterior aspect). Dissection of pancreatic and common bile duct. The stomach has been removed, the liver raised, and the duodenum anteriorly opened.

1 Ligamentum teres
2 Gallbladder and cystic artery
3 Common hepatic duct and portal vein
4 Cystic duct
5 Right gastric artery (pylorus with superior part of duodenum, cut and reflected)
6 Gastroduodenal artery
7 Common bile duct
8 Probe within the minor duodenal papilla
9 Accessory pancreatic duct
10 Probe within the major duodenal papilla
11 Descending part of duodenum (opened)
12 Middle colic artery and inferior pancreaticoduodenal artery
13 Horizontal part of duodenum (distended)
14 Superior mesenteric artery
15 Liver (left lobe)
16 Caudate lobe of liver and hepatic artery proper
17 Abdominal part of esophagus (cut)
18 Probe in epiploic foramen and lymph node
19 Left gastric artery
20 Spleen
21 Splenic vein and branches of splenic artery
22 Main pancreatic duct and head of pancreas
23 Left colic flexure and tail of pancreas
24 Duodenojejunal flexure

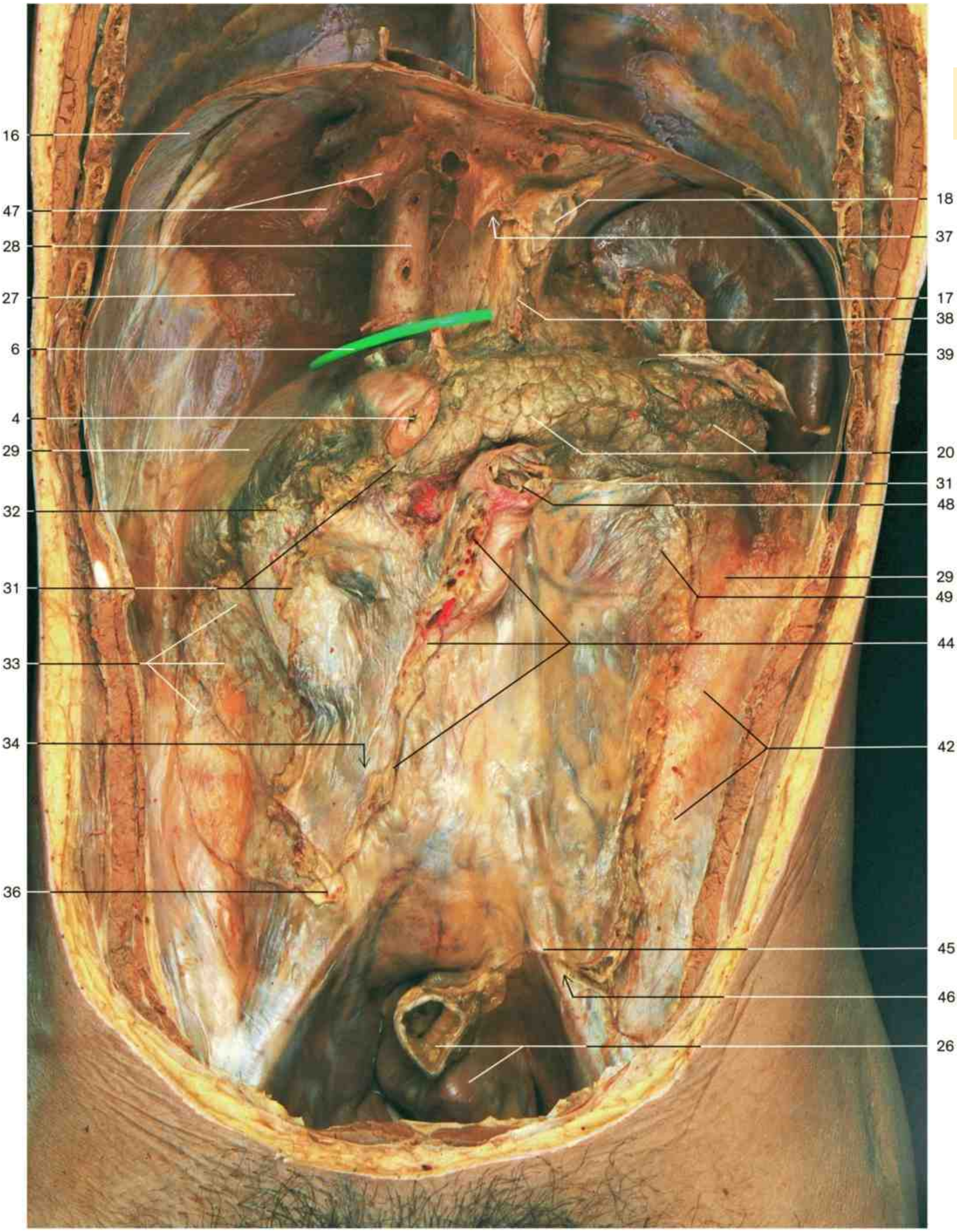


Abdominal cavity after removal of stomach, jejunum, ileum, and part of the transverse colon. Liver has been slightly raised.

1	Liver	
2	Falciform ligament	
3	Hepatoduodenal ligament	
4	Pylorus (divided)	
5	Gallbladder	
6	Probe within the epiploic foramen	
7	Duodenojejunal flexure (divided)	
8	Greater omentum	
9	Root of mesentery	
10	Ascending colon	
11	Free colic taenia	
12	End of ileum (divided)	
13	Vermiform appendix with meso-appendix	
14	Cecum	
15	Pancreas and site of lesser sac	
16	Diaphragm	
17	Spleen	
18	Cardia (part of stomach, divided)	
19	Head of pancreas	
20	Body and tail of pancreas	
21	Transverse mesocolon	
22	Transverse colon (divided)	
23	Descending colon	
24	Cut edge of mesentery	
25	Sigmoid colon	
26	Rectum	
27	Attachment of bare area of liver	
28	Inferior vena cava	
29	Kidney	
30	Attachment of right colic flexure	
31	Root of transverse mesocolon	
32	Junction between descending and horizontal parts of duodenum	
33	Bare surface for ascending colon	
34	Ileocecal recess	
35	Retrocecal recess	
36	Root of meso-appendix	
37	Superior recess	of lesser sac (omental bursa)
38	Isthmus (opening)	
39	Splenic recess	
40	Superior duodenal recess	
41	Inferior duodenal recess	
42	Bare surface for descending colon	
43	Paracolic recesses	
44	Root of mesentery	
45	Root of mesosigmoid	
46	Intersigmoid recess	
47	Hepatic veins	
48	Duodenojejunal flexure	
49	Attachment of left colic flexure	
50	Esophagus	
51	Entrance to lesser sac through the epiploic foramen	



Peritoneal reflections from organs and the position of root of mesentery and peritoneal recesses on the posterior abdominal wall (schematic drawing).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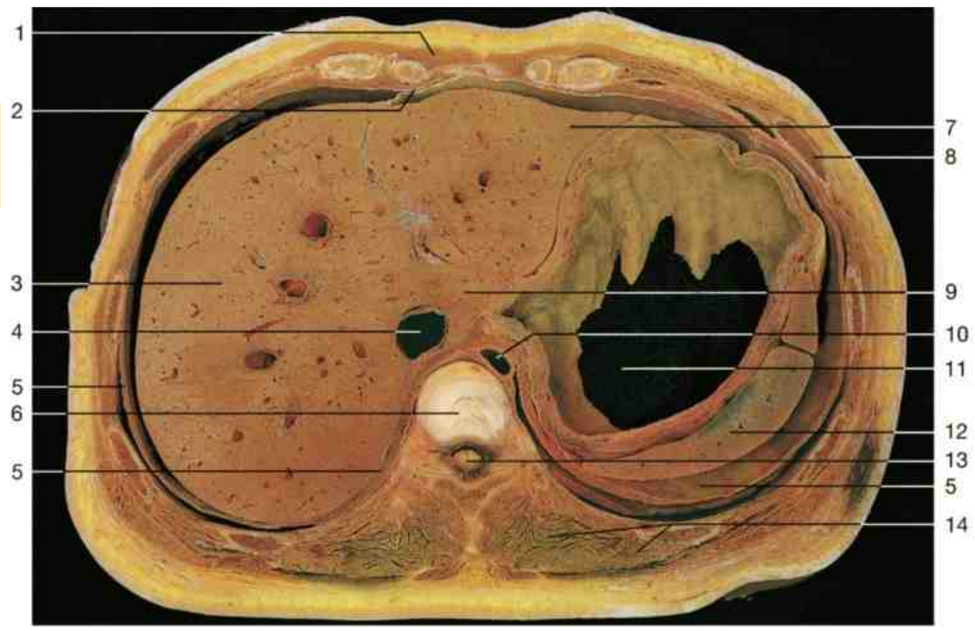
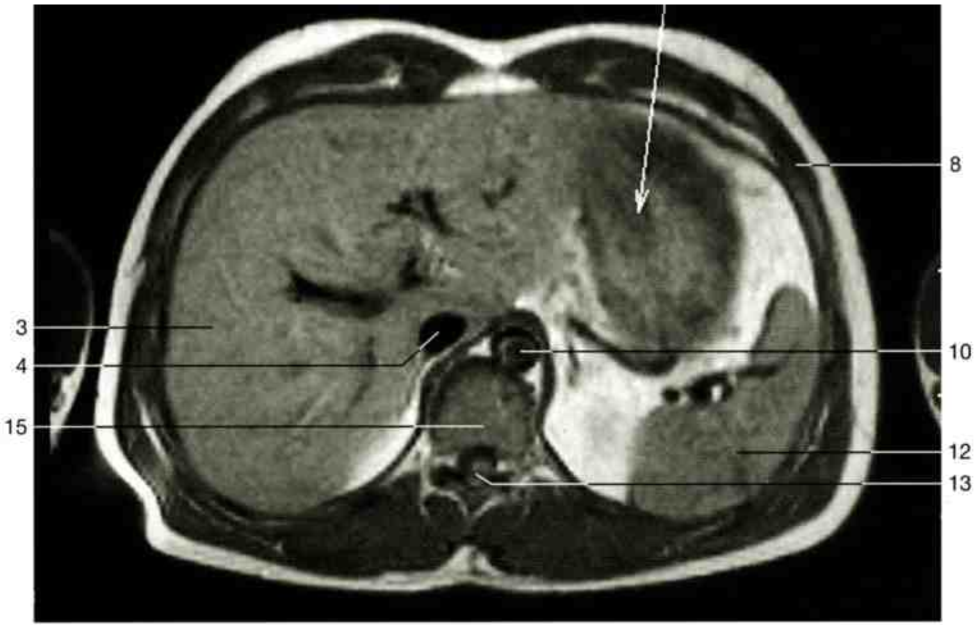
Peritoneal recesses on the posterior abdominal wall. The liver, stomach, jejunum, ileum, and colon have been removed. The duodenum, pancreas, and spleen have been left in place.

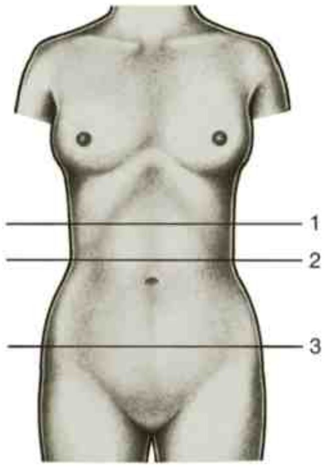


Horizontal section through the abdominal cavity at level 1 (from below).

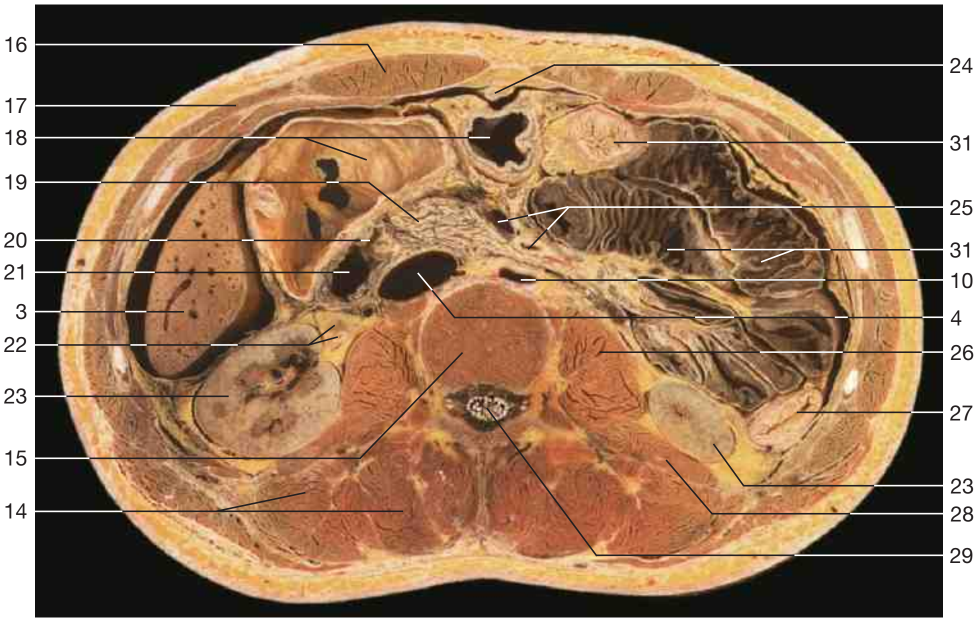


Horizontal section through the abdominal cavity (MRI scan, corresponding to level 1). Arrow: stomach.

1 Rectus abdominis muscle
2 Falciform ligament
3 Liver (right lobe)
4 Inferior vena cava
5 Diaphragm
6 Intervertebral disc
7 Liver (left lobe)
8 Rib
9 Liver (caudate lobe)
10 Abdominal (descending) aorta
11 Stomach
12 Spleen
13 Spinal cord
14 Longissimus and iliocostalis muscles
15 Body of vertebra
16 Rectus abdominis muscle
17 External abdominal oblique muscle
18 Transverse colon
19 Head of pancreas
20 Greater duodenal papilla
21 Duodenum
22 Suprarenal gland and ureter
23 Kidney
24 Round ligament of liver
25 Superior mesenteric artery and vein
26 Psoas major muscle
27 Descending colon
28 Quadratus lumborum muscle
29 Cauda equina
30 Right renal vein
31 Small intestine
32 Iliacus muscle
33 Ilium
34 Ileocecal valve
35 Cecum
36 Common iliac artery and vein
37 Gluteus medius muscle
38 Vertebral canal and dura mater



Levels of sections.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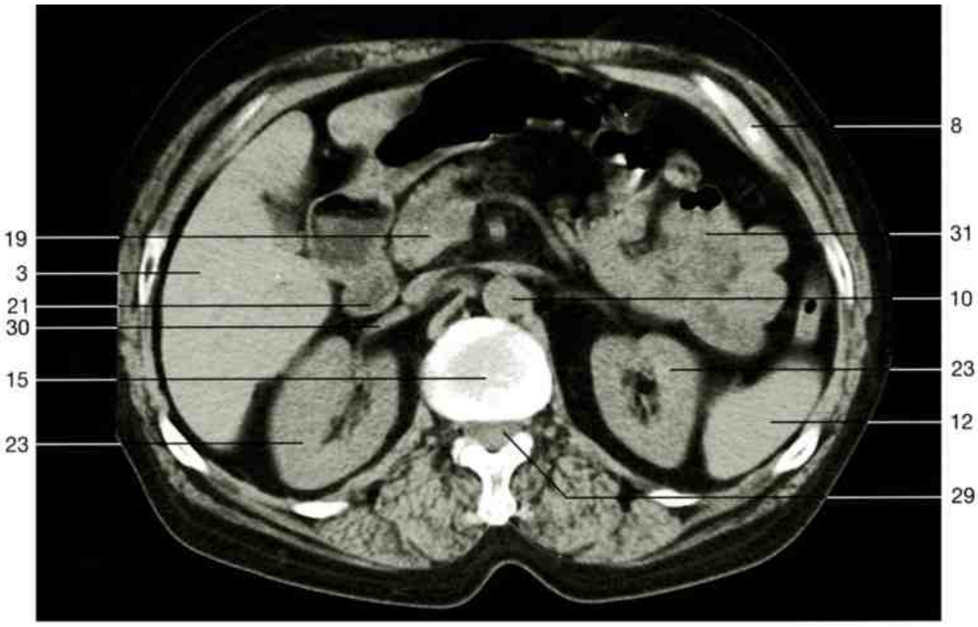
Horizontal section through the abdominal cavity at the level of greater duodenal papilla (from below).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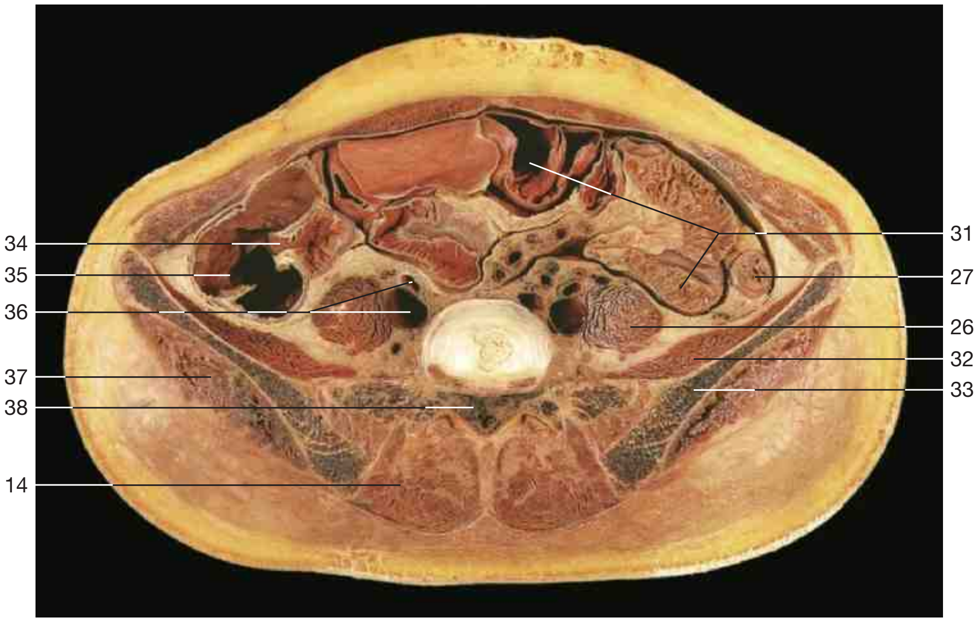
Horizontal section through the abdominal cavity (CT scan, corresponding to level 2).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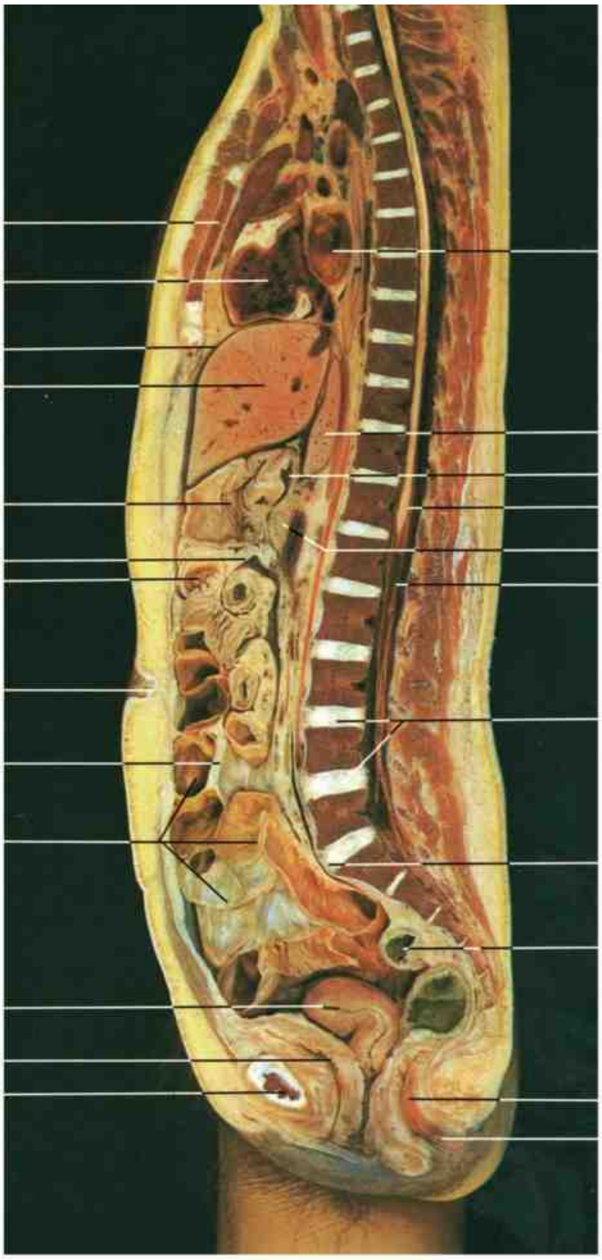
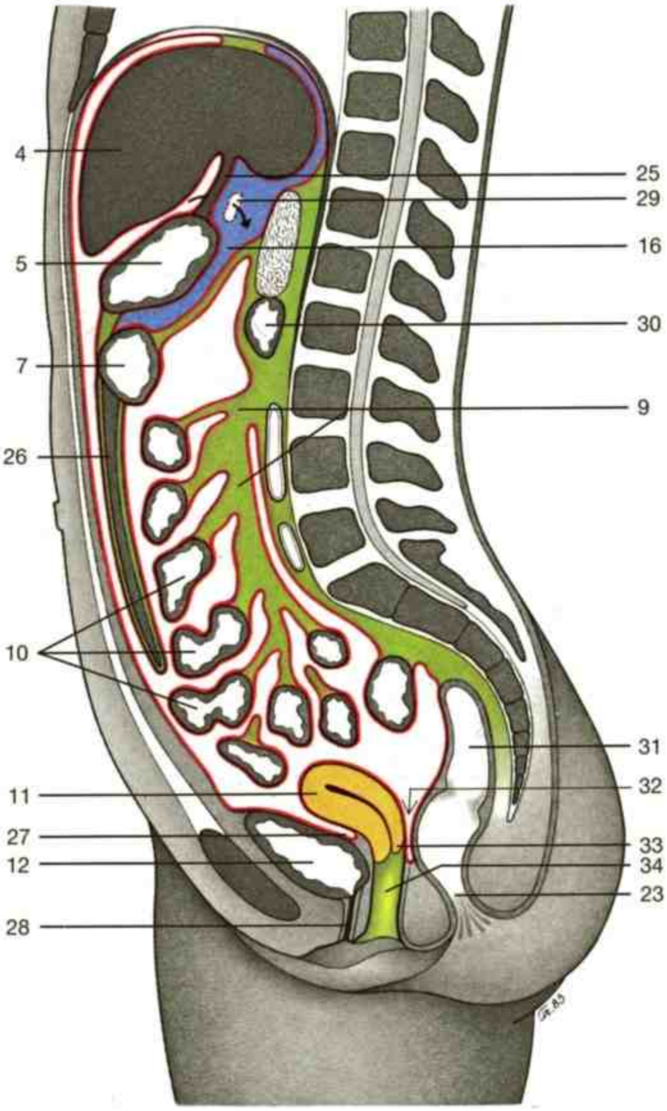
Horizontal section through the abdominal cavity at level 3 (from below).



Midsagittal section through the trunk (female).



Midsagittal section through the trunk (female).
(Schematic drawing.) Blue = omental bursa; red = peritoneum.

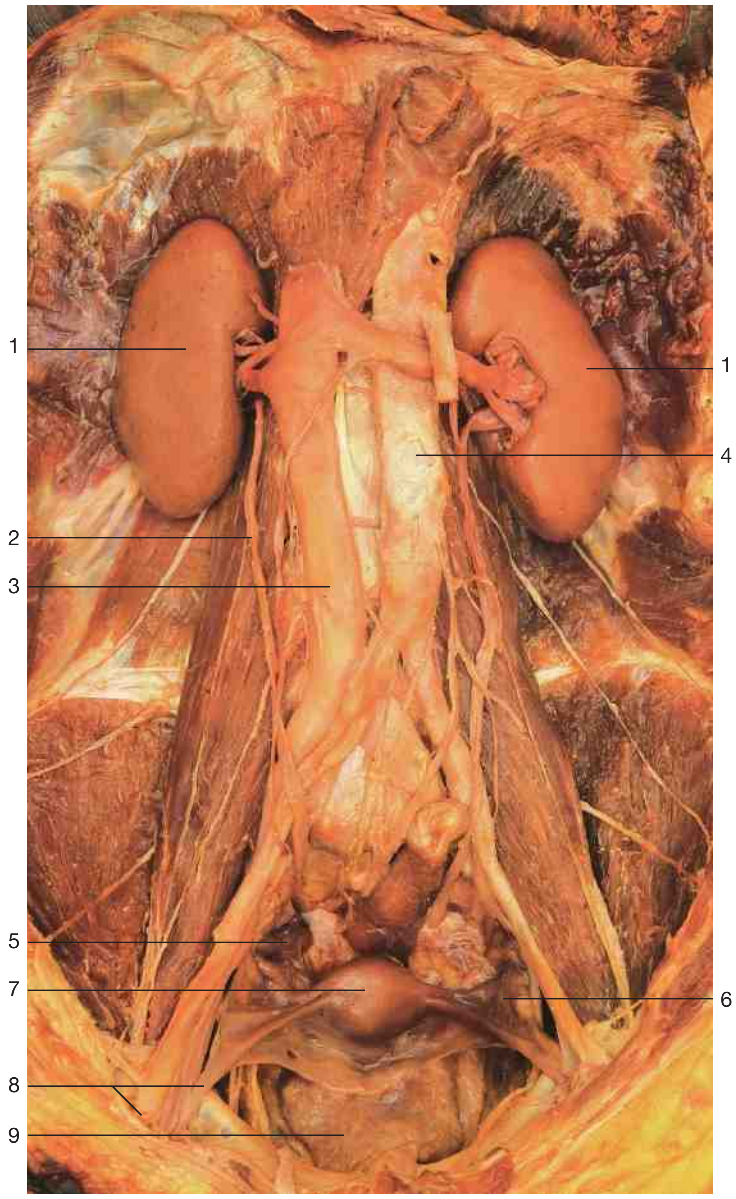
1 Sternum
2 Right ventricle of heart
3 Diaphragm
4 Liver
5 Stomach
6 Transverse mesocolon
7 Transverse colon
8 Umbilicus
9 Mesentery
10 Small intestine
11 Uterus
12 Urinary bladder
13 Pubic symphysis
14 Left atrium of heart
15 Caudate lobe of liver
16 Omental bursa or lesser sac
17 Conus medullaris
18 Pancreas
19 Cauda equina
20 Intervertebral discs (lumbar vertebral column)
21 Sacral promontory
22 Sigmoid colon
23 Anal canal
24 Anus
25 Lesser omentum
26 Greater omentum
27 Vesico-uterine pouch
28 Urethra
29 Epiploic (omental) foramen
30 Duodenum
31 Rectum
32 Recto-uterine pouch
33 Vaginal part of cervix of uterus
34 Vagina

6 Retroperitoneal Organs

The organs of the urinary system (kidney, ureter, and, in the female, genital organs) are located together with vessels and nerves (aorta, inferior vena cava, plexus solaris, etc.) within the retroperitoneal space.

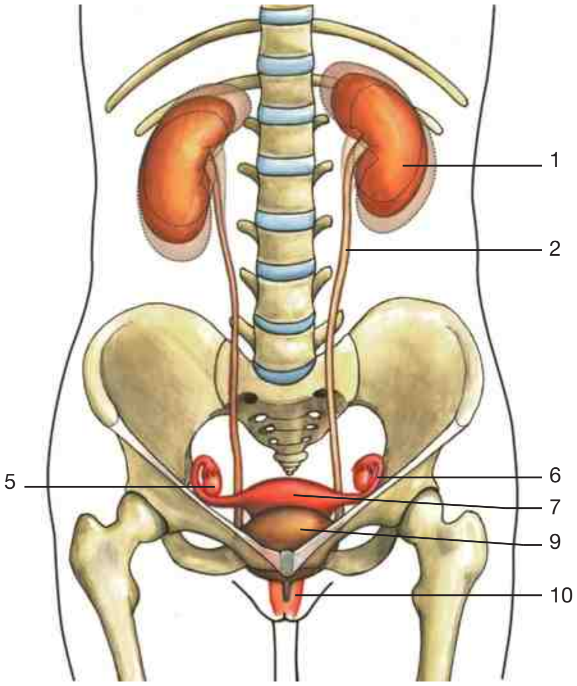
The upper part of the kidneys reaches the level of the margin of the lung. During respiration, the kidneys move slightly within their fasciae of Gerota. Parallel with the vertebral column, the ureter runs towards the urinary bladder. The great center of the autonomic nervous system, the solar plexus (celiac ganglion, etc.), is located in front of the abdominal aorta.

The genital organs of the female (uterus, uterine tube, ovary) are located within the pelvic cavity. In the male, the testis has moved out of the abdominal cavity and penetrated the inguinal canal to be finally located within the extragenital organs.



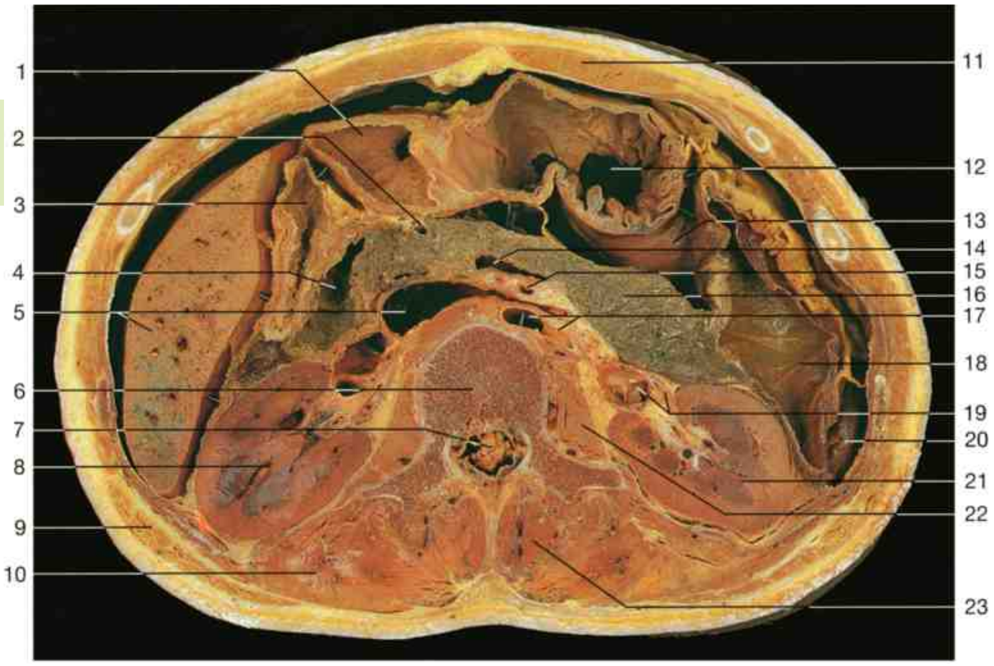
Retroperitoneal organs of the female (anterior aspect). View of the female pelvis showing uterus with uterine ligaments, ovary, and urinary bladder (from Lütjen-Drecoll, Rohen, Innenansichten des menschlichen Körpers, 2010).

1	Kidney
2	Ureter
3	Inferior vena cava
4	Abdominal aorta
5	Ovary
6	Uterine tube
7	Uterus
8	Round ligament and inguinal canal
9	Urinary bladder
10	Vagina



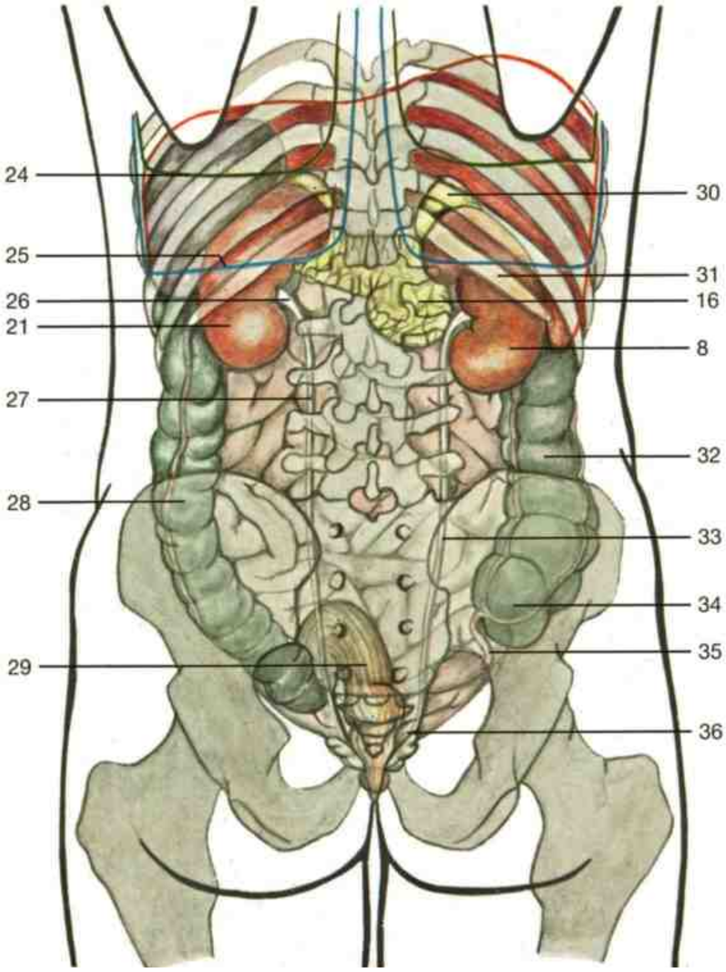
Position of kidneys, urinary and genital organs in the female (anterior aspect, schematic drawing). The excursions of the kidneys with the respiratory movements of the diaphragm are indicated.

Position of the Urinary Organs

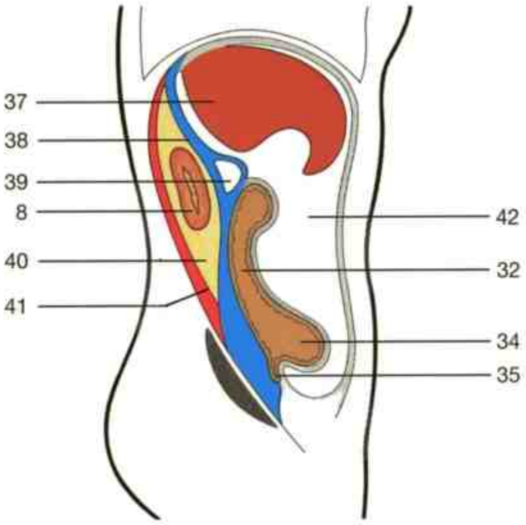


Horizontal section through the abdominal cavity at the level of the first lumbar vertebra (from below).

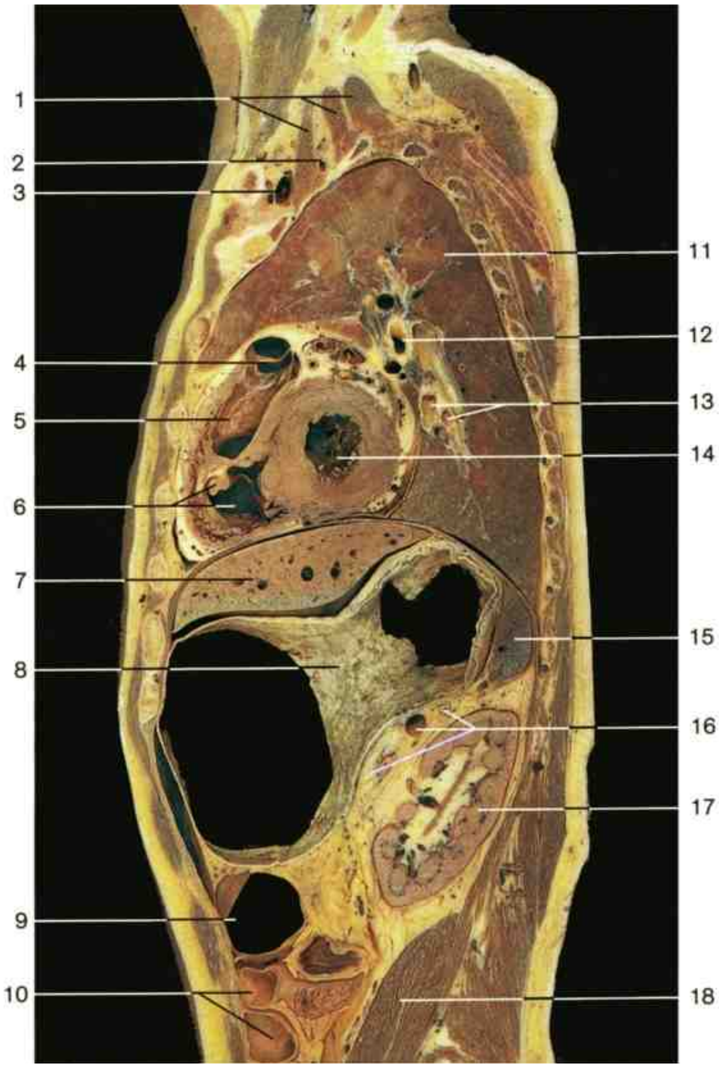
1	Pyloric antrum
2	Gastroduodenal artery
3	Descending part of duodenum
4	Vestibule of lesser sac
5	Inferior vena cava and liver
6	Body of first lumbar vertebra
7	Cauda equina
8	Right kidney
9	Latissimus dorsi muscle
10	Iliocostalis muscle
11	Rectus abdominis muscle
12	Stomach
13	Lesser sac
14	Splenic vein
15	Superior mesenteric artery
16	Pancreas
17	Aorta and left renal artery
18	Transverse colon
19	Renal artery and vein
20	Spleen
21	Left kidney
22	Psoas major muscle
23	Multifidus muscle
24	Margin of lung
25	Margin of pleura
26	Renal pelvis
27	Left ureter
28	Descending colon
29	Rectum
30	Right suprarenal gland
31	Twelfth rib
32	Ascending colon
33	Right ureter
34	Cecum
35	Vermiform appendix
36	Urinary bladder
37	Liver
38	Anterior layer of renal fascia
39	Duodenum
40	Perirenal fatty tissue
41	Posterior layer of renal fascia
42	Abdominal cavity



Positions of urinary organs (posterior aspect, schematic drawing). Notice that the upper part of the kidney reaches the level of the margin of pleura and lung.

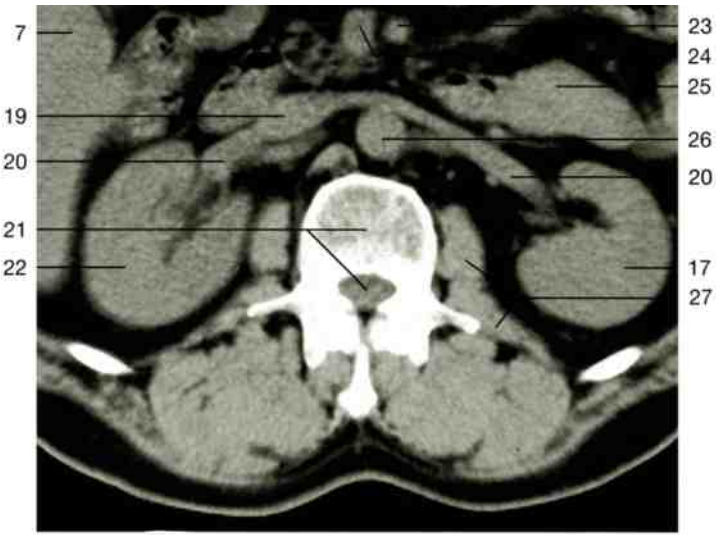


Retroperitoneal tissue, position of the right kidney (schematic drawing).
Yellow = adipose capsule of kidney.

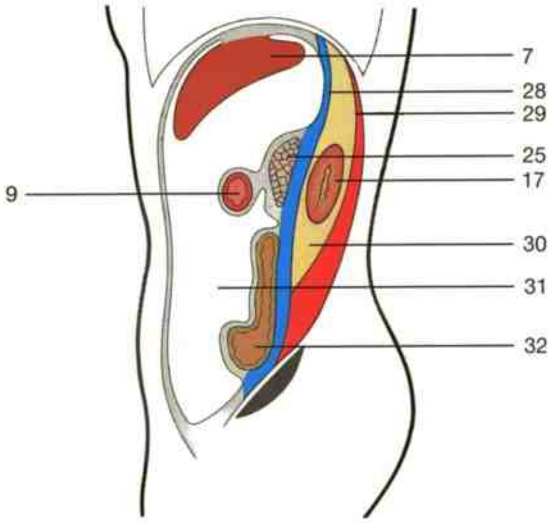


Parasagittal section through the thoracic and abdominal cavities at the level of the left kidney (5.5 cm left of median plane).

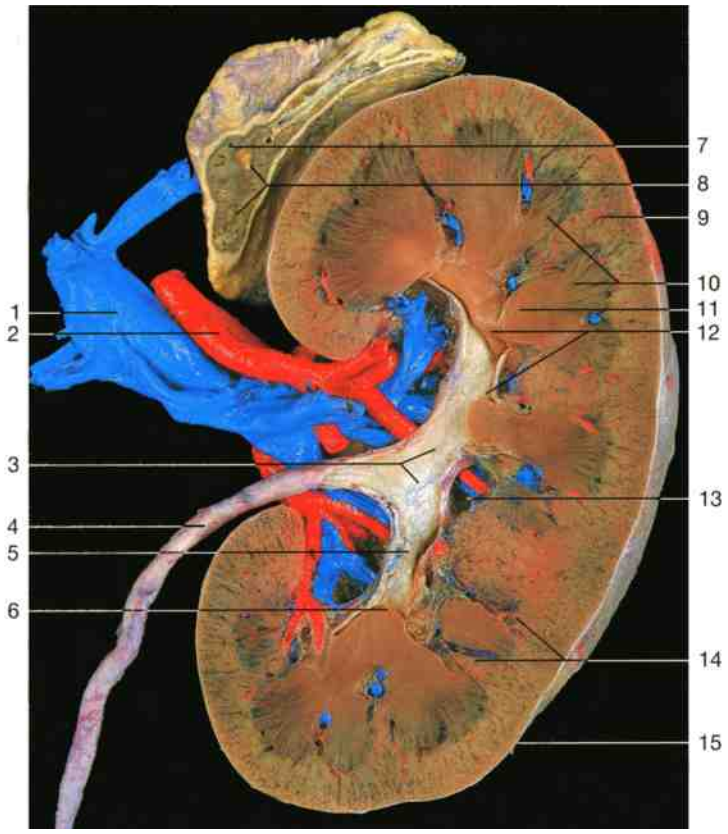
1 Scalenus anterior, medius, and posterior muscles
2 Left subclavian artery
3 Left subclavian vein
4 Pulmonic valve
5 Arterial cone
6 Right ventricle of heart
7 Liver
8 Stomach
9 Transverse colon
10 Small intestine
11 Left lung
12 Left main bronchus
13 Branches of pulmonary vein
14 Left ventricle of heart
15 Spleen
16 Splenic artery and vein and pancreas
17 Left kidney
18 Psoas major muscle
19 Inferior vena cava
20 Renal vein
21 Body of twelfth thoracic vertebra and vertebral canal
22 Right kidney
23 Superior mesenteric artery
24 Superior mesenteric vein
25 Pancreas
26 Abdominal aorta
27 Left psoas major and quadratus lumborum muscles
28 Anterior layer of renal fascia } of Gerota
29 Posterior layer of renal fascia }
30 Perirenal fatty tissue
31 Abdominal cavity
32 Descending and sigmoid colon



Horizontal section through the retroperitoneal region at the level of 12th thoracic vertebra (CT scan, from below).

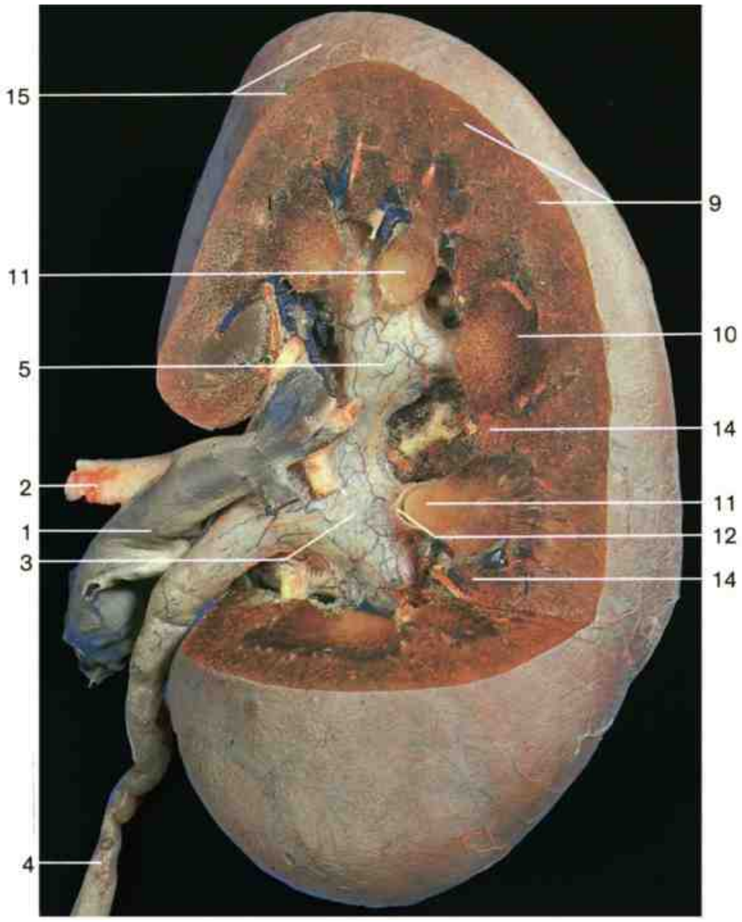


Retroperitoneal tissue, position of the left kidney (schematic drawing).



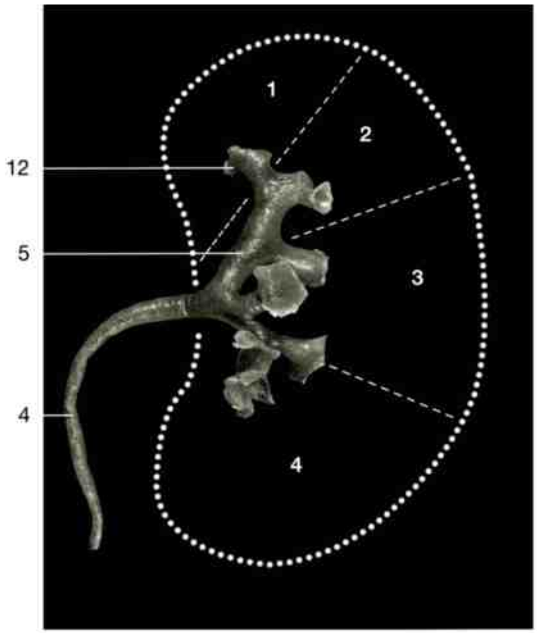
Coronal section through right kidney and suprarenal gland (posterior aspect). The renal pelvis has been opened and the fatty tissue removed to display the renal vessels.

1	Renal vein
2	Renal artery
3	Renal pelvis
4	Abdominal part of ureter
5	Major renal calyx
6	Cribriform area of renal papilla
7	Cortex of suprarenal gland
8	Medulla of suprarenal gland
9	Cortex of kidney
10	Medulla of kidney
11	Renal papilla
12	Minor renal calyx
13	Renal sinus
14	Renal columns
15	Fibrous capsule of kidney

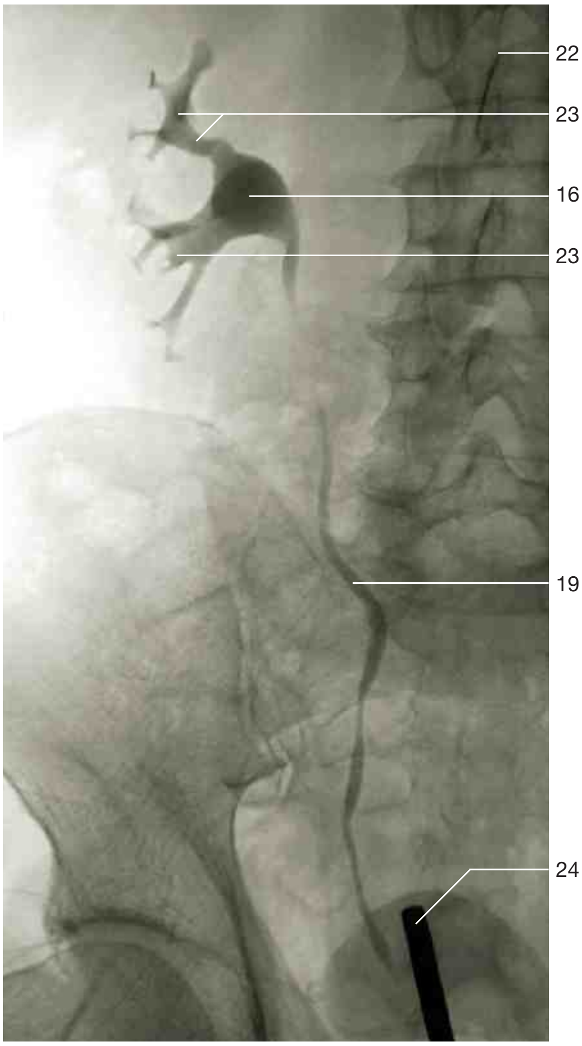


Right kidney (posterior aspect). Partial coronal section to expose internal aspect of the kidney.

Each kidney can be divided into five segments supplied by individual interlobar arteries known as end arteries. Thus, obstruction leads to infarcts marking the trace of segment borders. The anterior kidney surface reveals four segments; the posterior, only three (Nos. 1, 4, and 5).

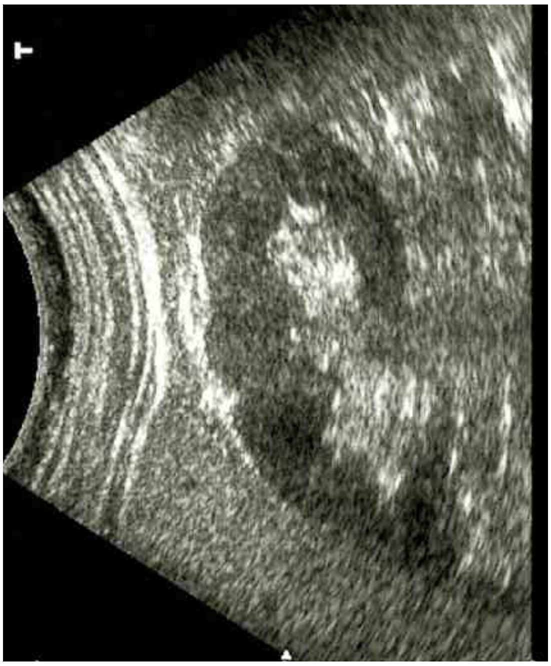


Cast of renal pelvis and calices.
1–4 = Renal segments on anterior surface.

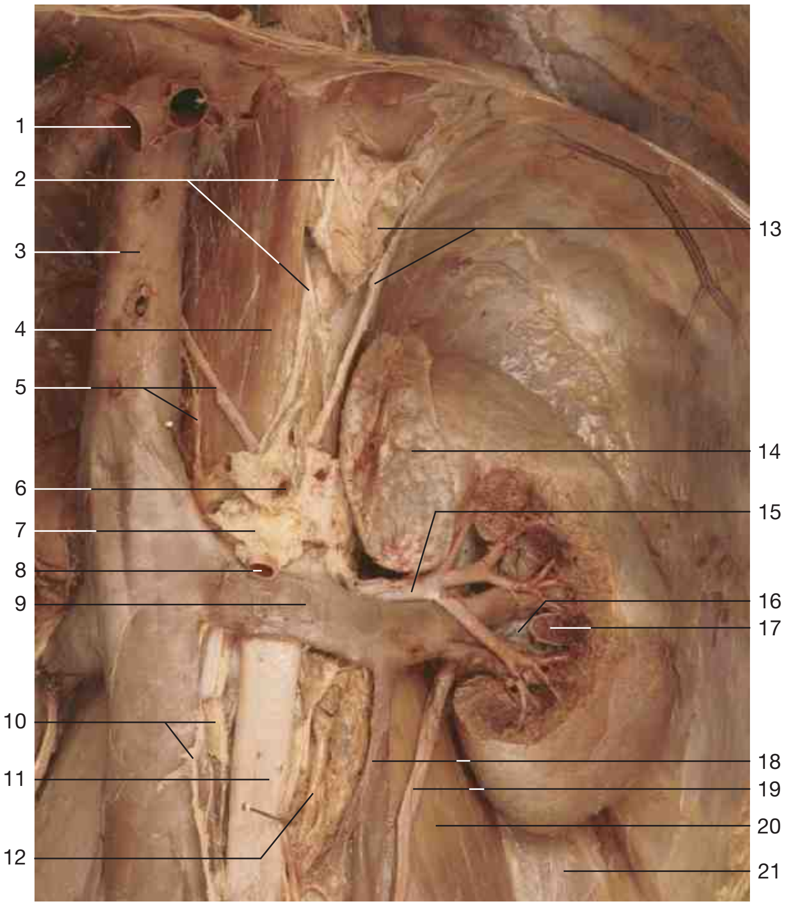


Renal pelvis with calices and ureter (X-ray, retrograde injection; by courtesy of Prof. Herrlinger, Fürth, Germany).

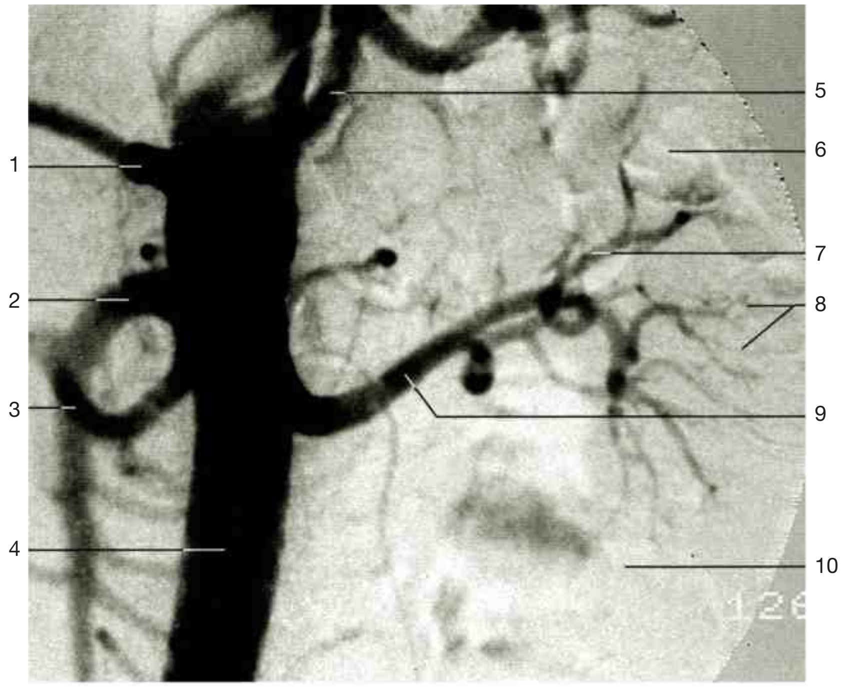
1	Hepatic vein
2	Anterior and posterior vagal trunk
3	Inferior vena cava
4	Lumbar part of diaphragm
5	Right greater and lesser splanchnic nerves
6	Celiac trunk
7	Celiac ganglion and plexus
8	Superior mesenteric artery
9	Left renal vein
10	Right sympathetic trunk and ganglion
11	Abdominal aorta
12	Left sympathetic trunk
13	Esophagus (cut), left greater splanchnic nerve
14	Left suprarenal gland
15	Left renal artery
16	Renal pelvis
17	Renal papilla with minor calyx
18	Left testicular vein
19	Ureter
20	Psoas major muscle
21	Quadratus lumborum muscle
22	Lumbar vertebra (L_2)
23	Renal calyx
24	Catheter



Right kidney (ultrasound image; by courtesy of Prof. Herrlinger, Fürth, Germany).

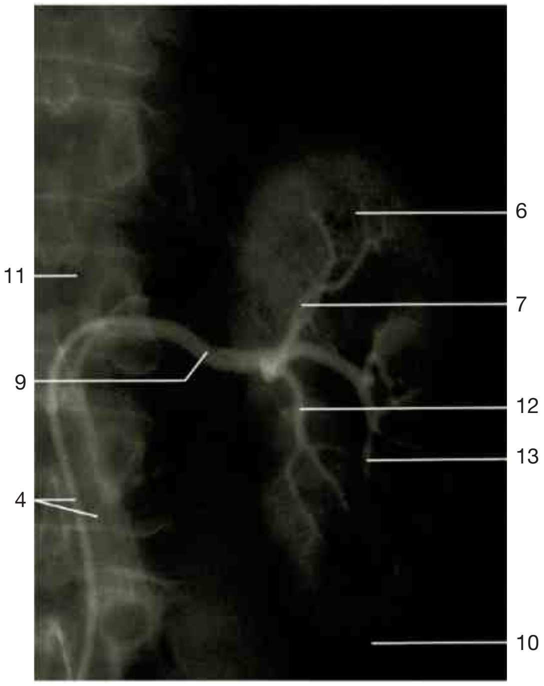


Left kidney and suprarenal gland in situ. The anterior cortical layer of the kidney has been removed to display the renal pelvis and papillae.

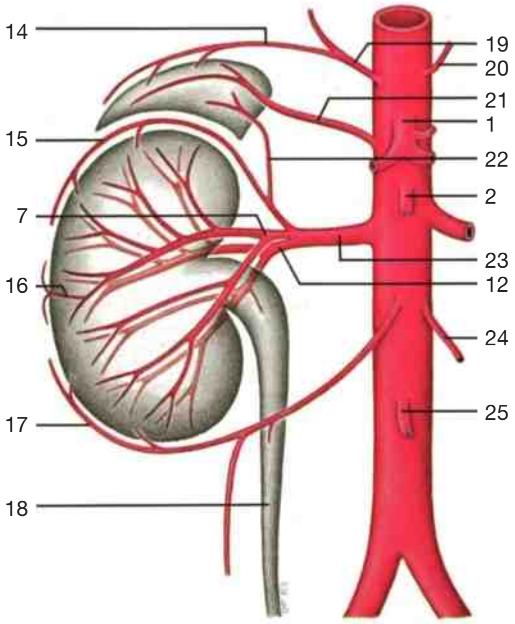


Abdominal aorta (subtraction angiography).

1	Celiac trunk
2	Superior mesenteric artery
3	Middle colic artery
4	Abdominal aorta (with catheter)
5	Splenic artery
6	Upper pole of kidney
7	Anterior branch of renal artery
8	Interlobular arteries
9	Left renal artery
10	Lower pole of kidney
11	Body of first lumbar vertebra
12	Posterior branch of renal artery
13	Anterior inferior segmental artery
14	Superior suprarenal artery
15	Upper capsular artery
16	Perforating artery
17	Lower capsular artery
18	Ureter
19	Right inferior phrenic artery
20	Left inferior phrenic artery
21	Middle suprarenal artery
22	Inferior suprarenal artery
23	Renal artery
24	Left testicular (or ovarian) artery
25	Inferior mesenteric artery



Left kidney (arteriography).

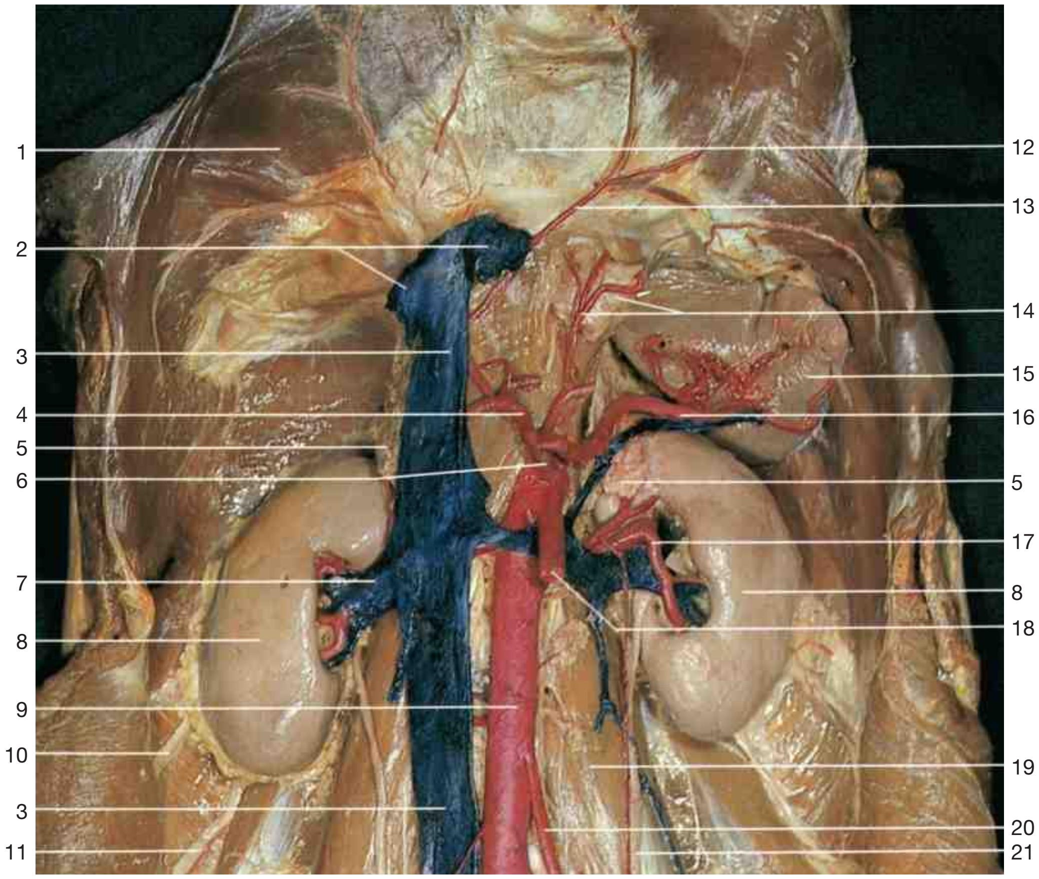


Arteries of kidney and suprarenal gland (schematic drawing).

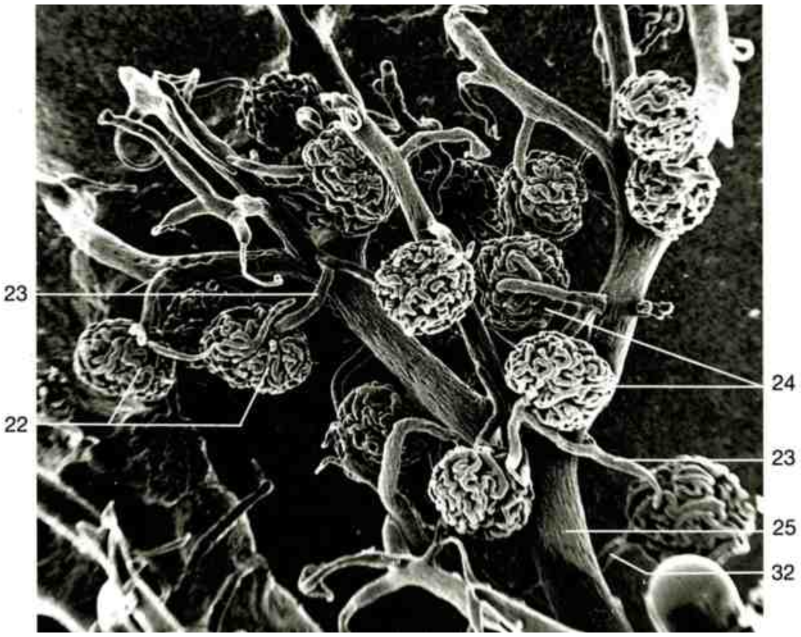
The kidneys are perfused by app. 1.500–1.800 l of blood per day via the renal arteries. Out of more than 1.2 million renal corpuscles (glomeruli), 1% of this volume (id 150–180 l) is filtered as a cell free fluid. In the tubular system, 99% of this fluid, together with useful substances like glucose and ions, are reabsorbed. Only 1–1.5 l of urine containing waste material is excreted.

Diseases of the renal vascular system may impair the filtering process and thereby the composition of the blood.

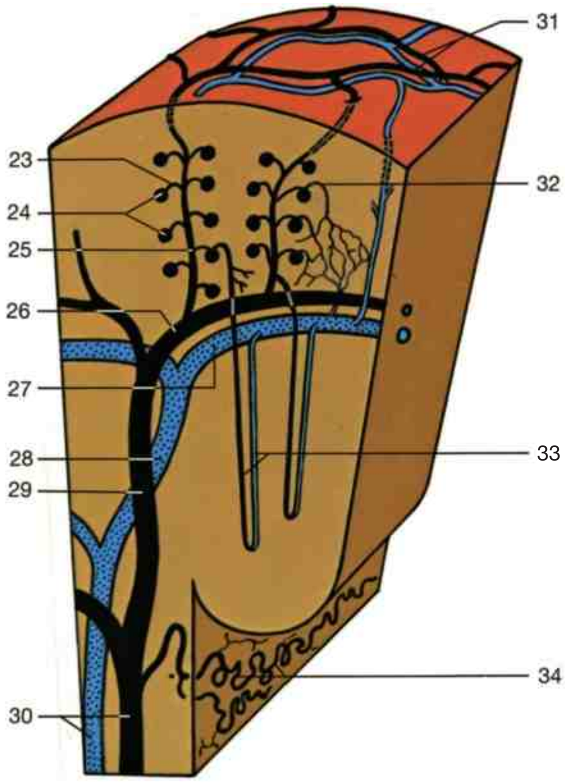
1 Diaphragm
2 Hepatic veins
3 Inferior vena cava
4 Common hepatic artery
5 Suprarenal gland
6 Celiac trunk
7 Right renal vein
8 Kidney
9 Abdominal aorta
10 Subcostal nerve
11 Iliohypogastric nerve
12 Central tendon of diaphragm
13 Inferior phrenic artery
14 Cardic part of stomach
15 Spleen
16 Splenic artery
17 Superior renal artery
18 Superior mesenteric artery
19 Psoas major muscle
20 Inferior mesenteric artery
21 Ureter
22 Glomerulus
23 Afferent arteriole of glomerulus
24 Glomeruli
25 Radiating cortical artery
26 Subcortical or arcuate artery
27 Subcortical or arcuate vein
28 Interlobular vein
29 Interlobular artery
30 Interlobar artery and vein
31 Vessels of renal capsule
32 Efferent arteriole of glomerulus
33 Vasa recta of renal medulla
34 Spiral arteries of renal pelvis



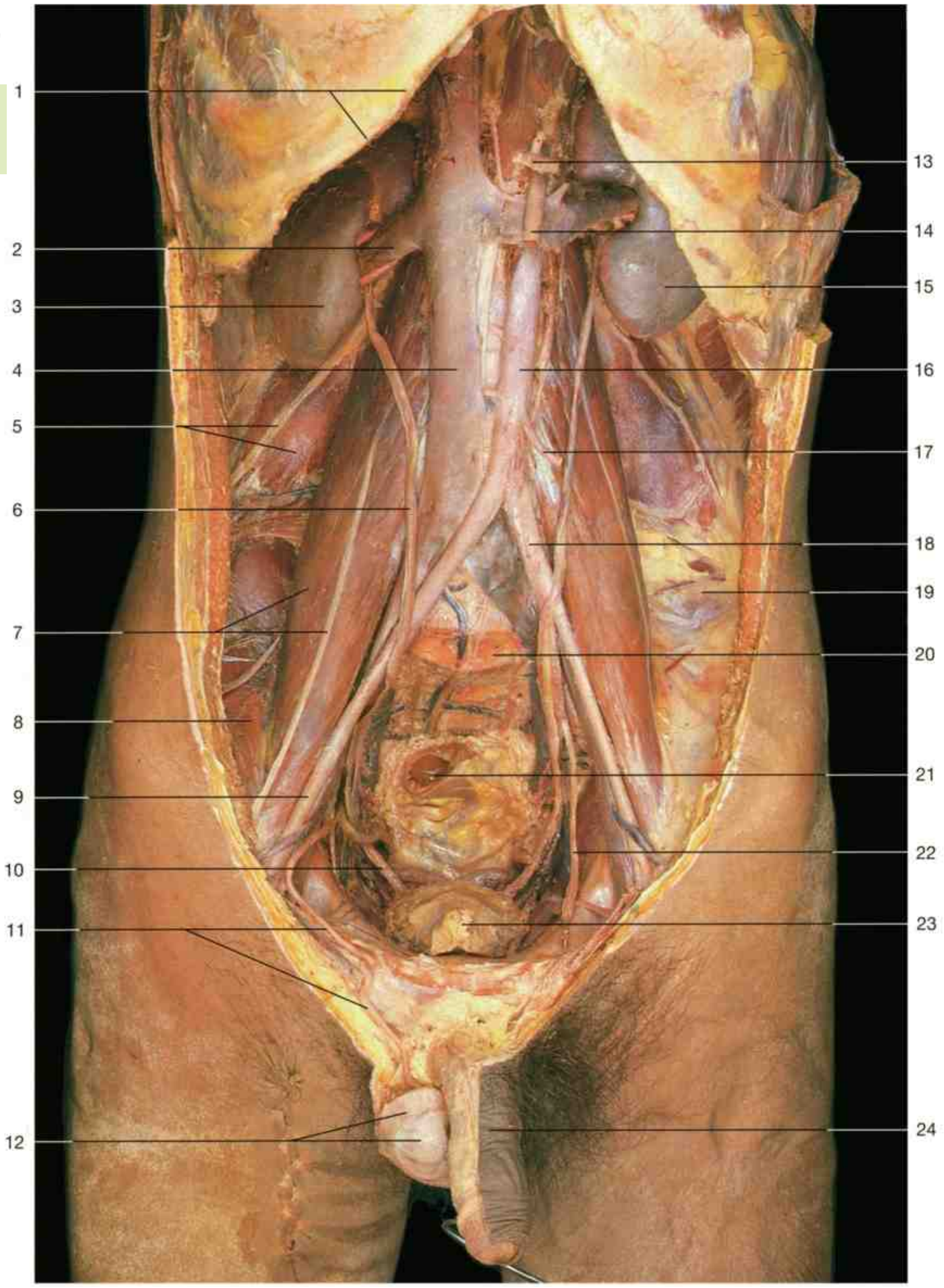
Retroperitoneal organs, kidneys, and suprarenal glands in situ (anterior aspect). Red = arteries; blue = veins.



Glomeruli (210 ×). Scanning electron micrograph showing glomeruli and associated arteries.

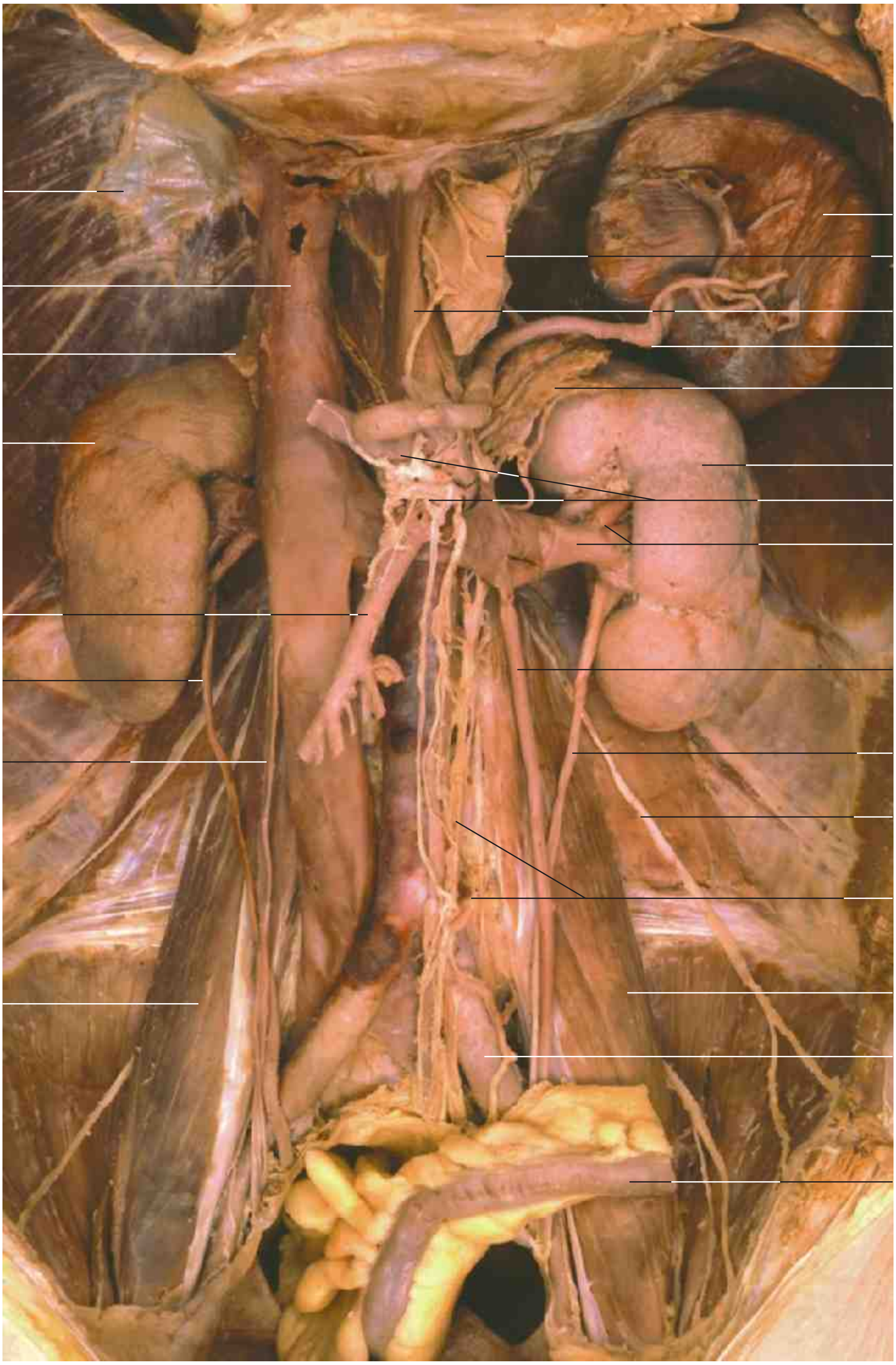


Architecture of vascular system of kidney (schematic drawing).



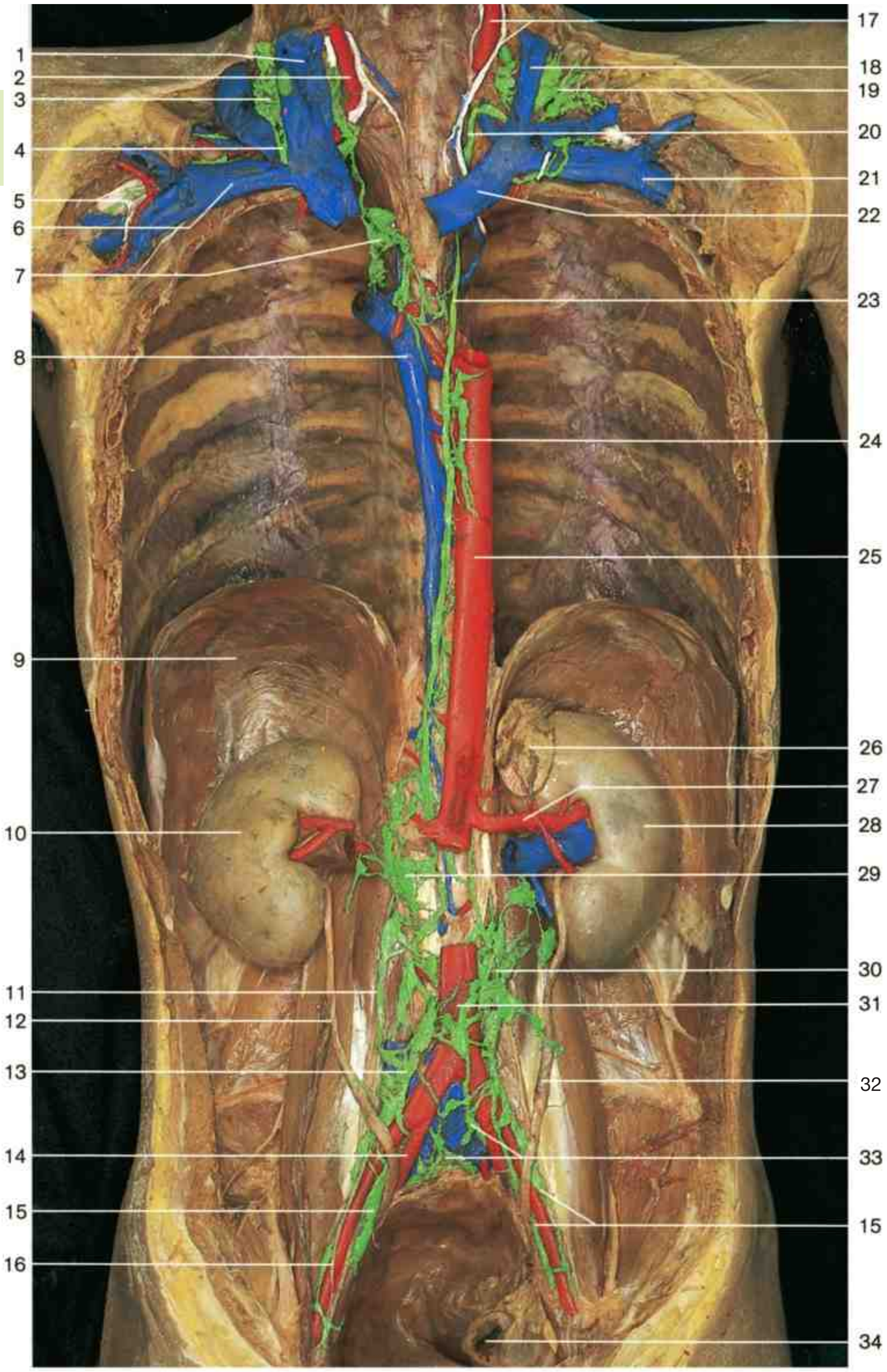
Retroperitoneal organs, urinary system in the male (anterior aspect). The peritoneum has been removed.

1 Costal arch
2 Right renal vein
3 Right kidney
4 Inferior vena cava
5 Iliohypogastric nerve and quadratus lumborum muscle
6 Ureter (abdominal part)
7 Psoas major muscle and genitofemoral nerve
8 Iliacus muscle
9 External iliac artery
10 Ureter (pelvic part)
11 Ductus deferens
12 Testis and epididymis
13 Celiac trunk
14 Superior mesenteric artery
15 Left kidney
16 Abdominal aorta
17 Inferior mesenteric artery
18 Common iliac artery
19 Iliac crest
20 Sacral promontory
21 Rectum (cut)
22 Medial umbilical ligament
23 Urinary bladder
24 Penis



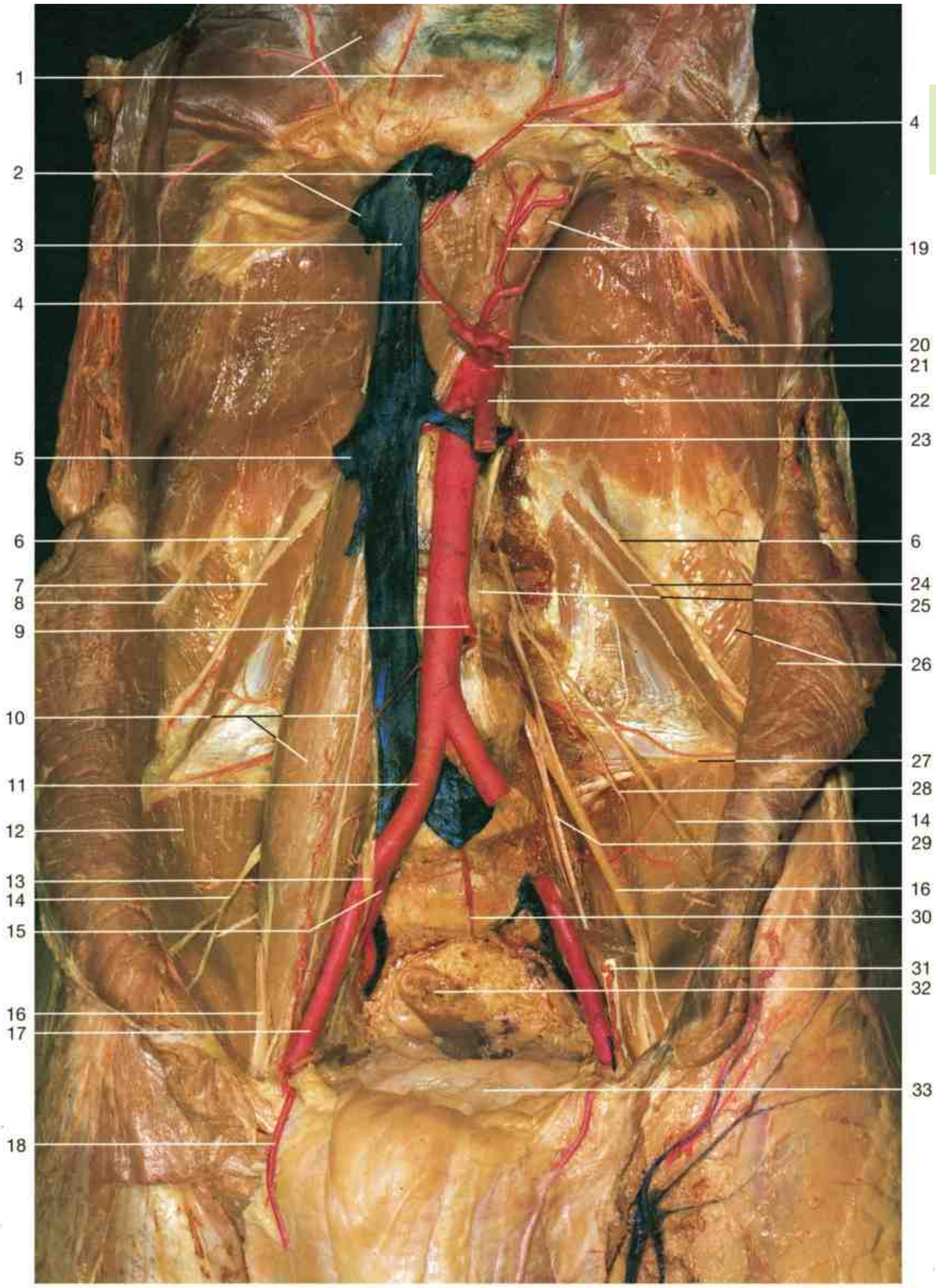
Retroperitoneal organs, urinary system in situ (anterior aspect). The peritoneum has been removed. Note the autonomic plexus and ganglia at the abdominal aorta.

1	Diaphragm	7	Right spermatic vein	11	Abdominal aorta	16	Ilio-inguinal nerve
2	Inferior vena cava	8	Psoas major muscle	12	Splenic artery	17	Superior hypogastric plexus and ganglion
3	Suprarenal gland	9	Spleen	13	Celiac trunk and celiac ganglion	18	Left common iliac artery
4	Kidney	10	Cardiac part of stomach	14	Renal artery and vein	19	Sigmoid colon
5	Superior mesenteric artery			15	Left spermatic vein		
6	Ureter						



Lymph vessels and lymph nodes of the posterior wall of thoracic and abdominal cavities (anterior aspect). Green = lymph vessels and nodes; blue = veins; red = arteries; white = nerves.

1 Internal jugular vein
2 Right common carotid artery and right vagus nerve
3 Jugulo-omohyoid lymph node
4 Right lymphatic duct
5 Subclavian trunk
6 Right subclavian vein
7 Bronchomediastinal trunk
8 Azygos vein
9 Diaphragm
10 Right kidney
11 Right lumbar trunk
12 Right ureter
13 Common iliac lymph nodes
14 Right internal iliac artery
15 External iliac lymph nodes
16 Right external iliac artery
17 Left common carotid artery and left vagus nerve
18 Internal jugular vein
19 Deep cervical lymph nodes
20 Thoracic duct entering left jugular angle
21 Left subclavian vein
22 Left brachiocephalic vein
23 Thoracic duct
24 Mediastinal lymph nodes
25 Thoracic aorta
26 Left suprarenal gland
27 Left renal artery
28 Left kidney
29 Cisterna chyli
30 Lumbar lymph nodes
31 Abdominal aorta
32 Left ureter
33 Sacral lymph nodes
34 Rectum (cut edge)



Vessels and nerves of posterior abdominal wall (anterior aspect). Part of the left psoas major muscle has been removed to display the lumbar plexus. Red = arteries; blue = veins.

1 Diaphragm

2 Hepatic veins

3 Inferior vena cava

4 Inferior phrenic artery

5 Right renal vein

6 Iliohypogastric nerve

7 Quadratus lumborum muscle

8 Subcostal nerve

9 Inferior mesenteric artery

10 Right genitofemoral nerve and psoas major muscle

11 Common iliac artery

12 Iliacus muscle

13 Right ureter (divided)

14 Lateral femoral cutaneous nerve

15 Internal iliac artery

16 Femoral nerve

17 External iliac artery

18 Inferior epigastric artery

19 Cardiac part of stomach and esophageal branches of left gastric artery

20 Splenic artery

21 Celiac trunk

22 Superior mesenteric artery

23 Left renal artery

24 Ilio-inguinal nerve

25 Sympathetic trunk

26 Transversus abdominis muscle

27 Iliac crest

28 Left genitofemoral nerve

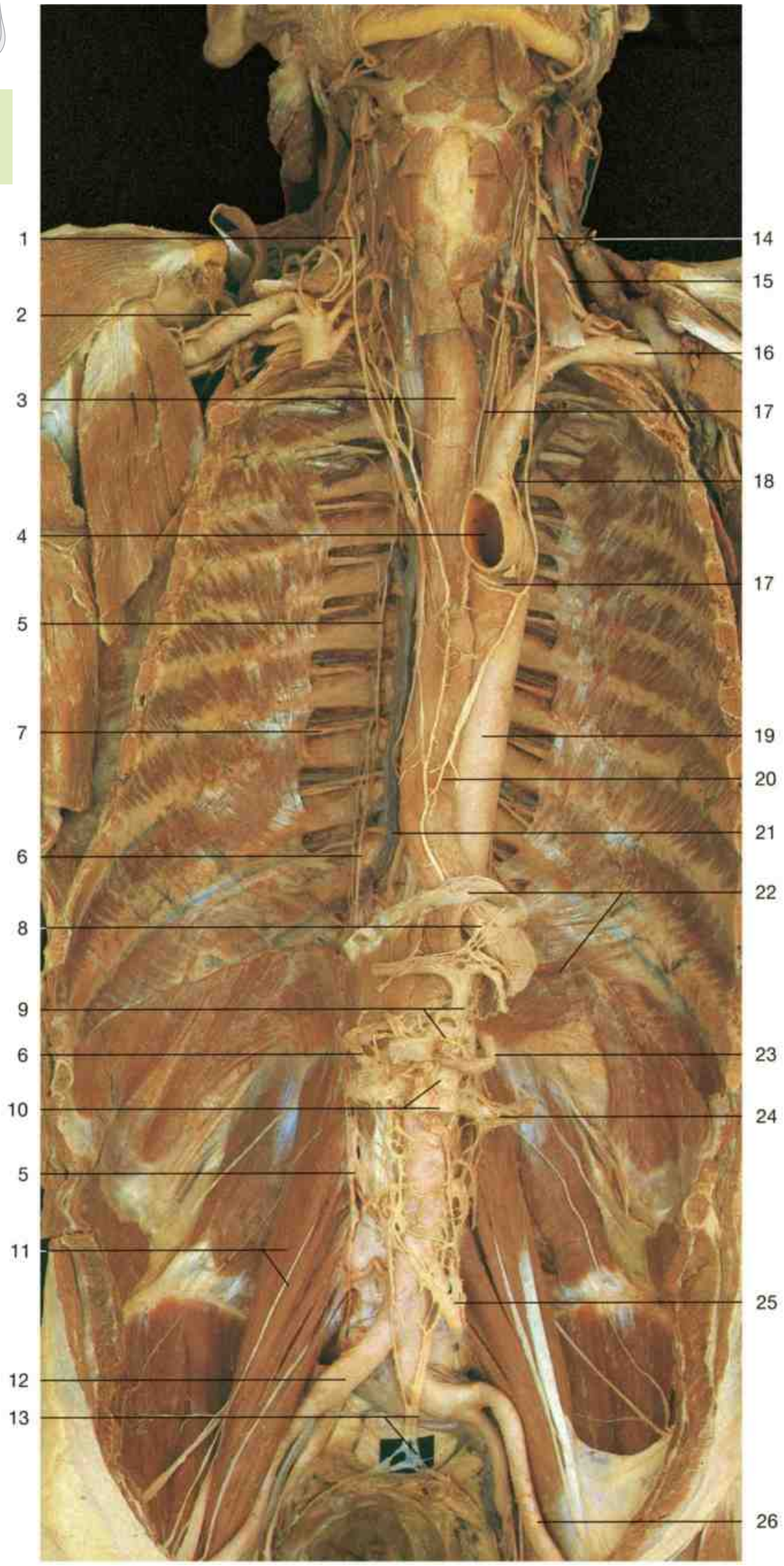
29 Left obturator nerve

30 Median sacral artery

31 Psoas major muscle (divided) with supplying artery

32 Rectum (cut)

33 Urinary bladder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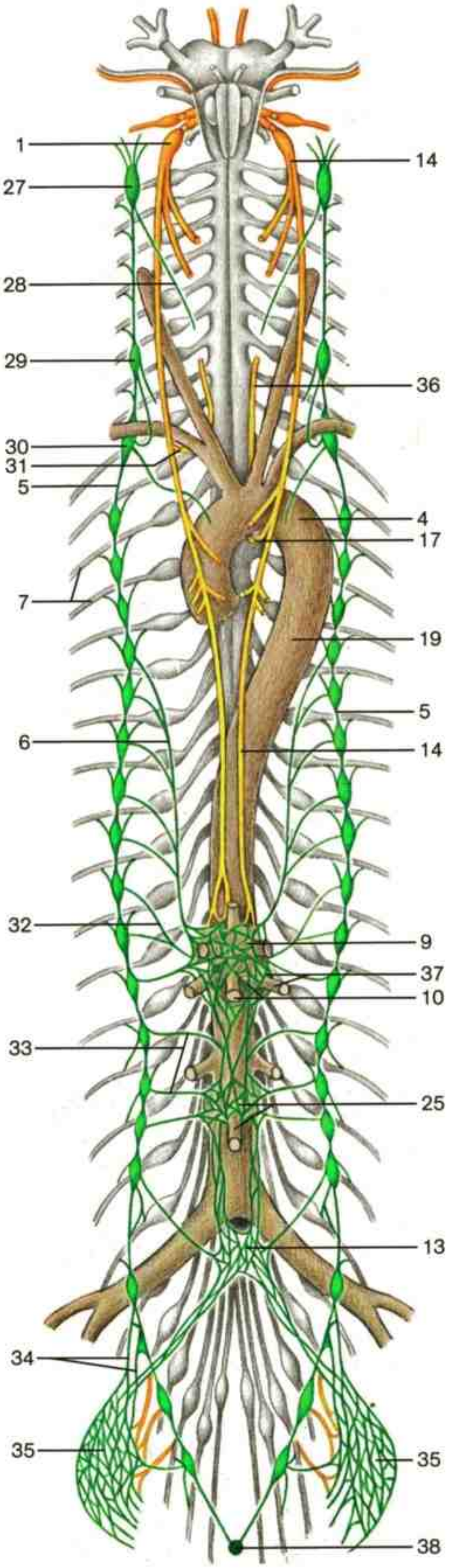
Posterior wall of thoracic and abdominal cavities with sympathetic trunk, vagus nerve, and autonomic ganglia (anterior aspect). Thoracic and abdominal organs removed, except for the esophagus and aorta.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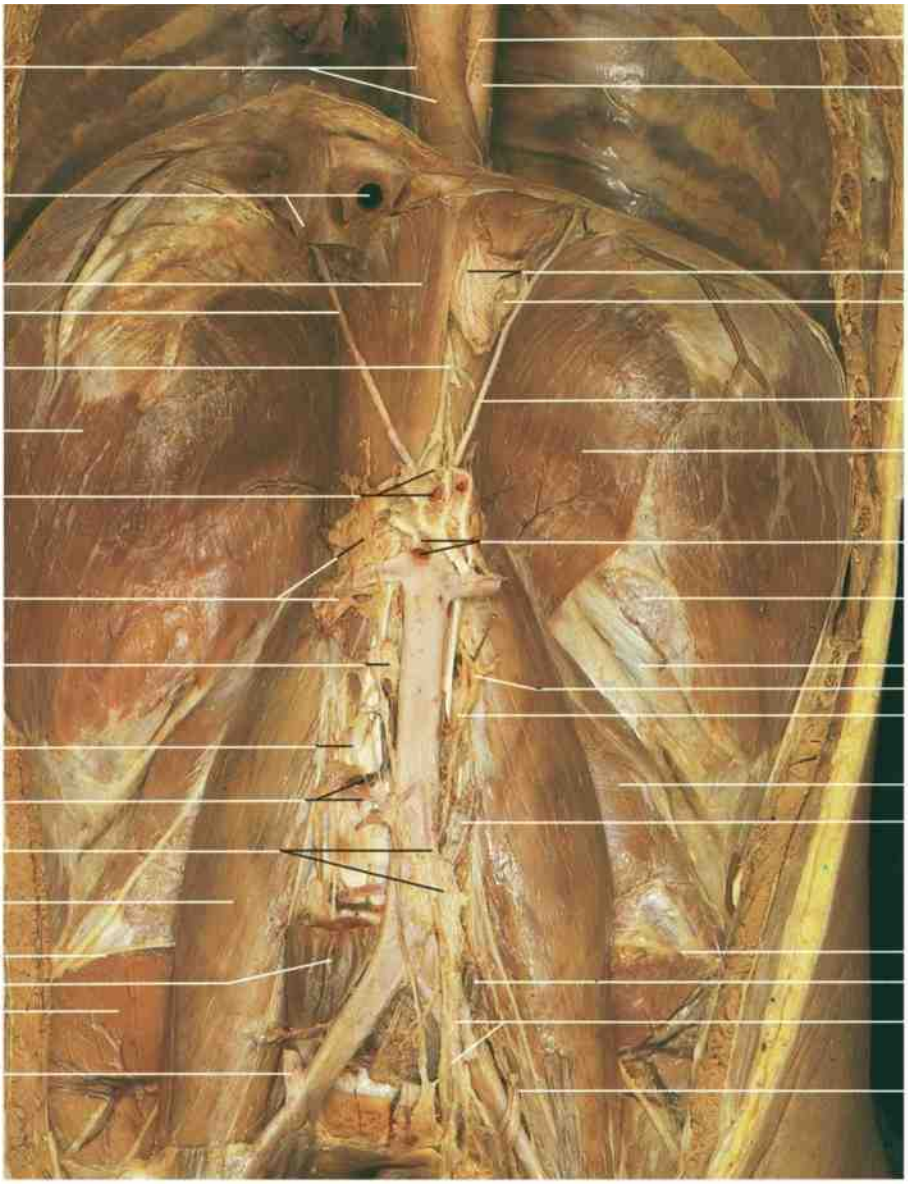
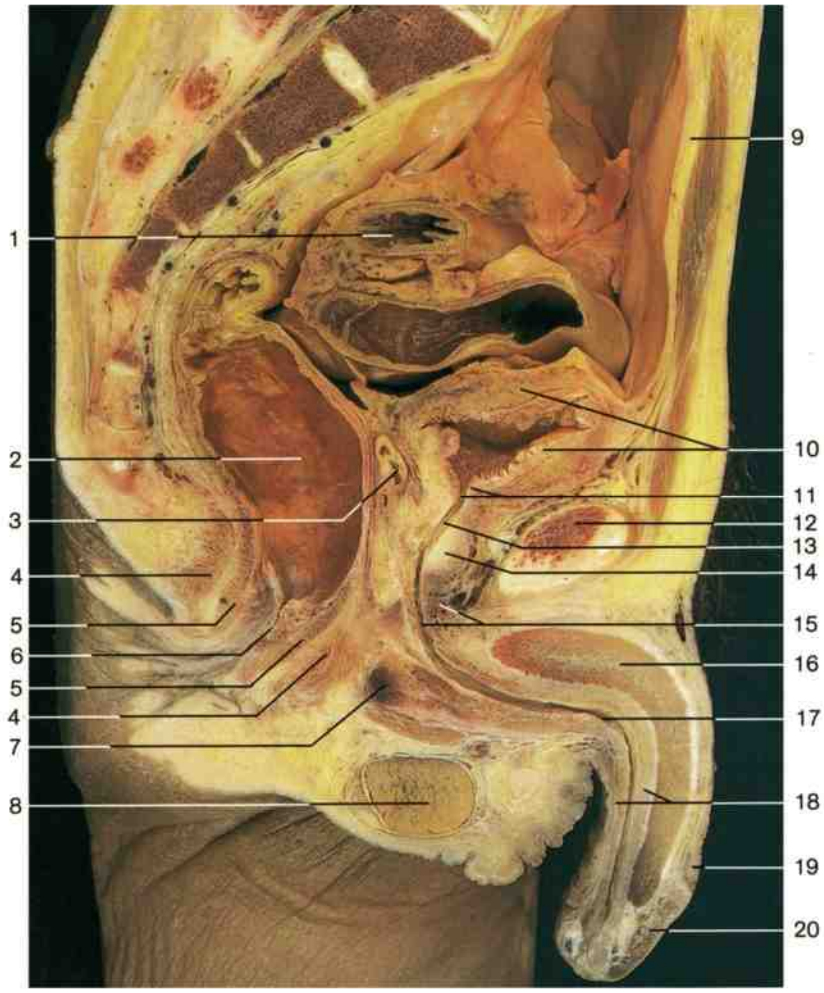
Organization of autonomic nervous system (after Mattuschka). (Schematic drawing.) Yellow = parasympathetic nerves; green = sympathetic nerves.



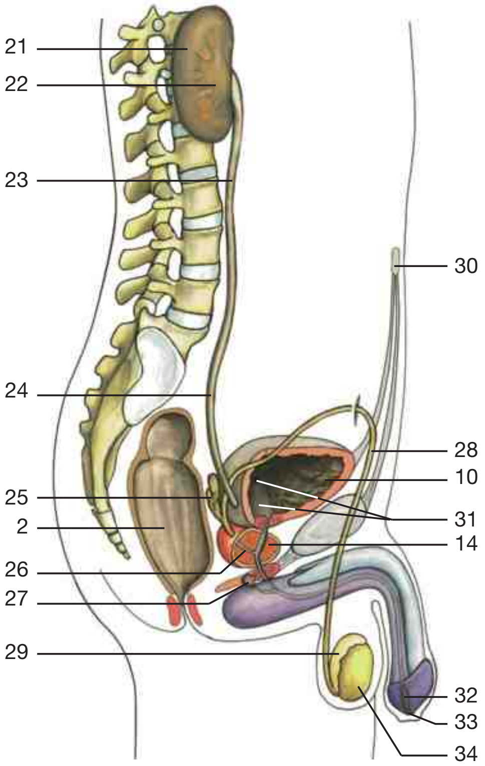
Ganglia and plexus of the autonomic nervous system within the retroperitoneal space (anterior aspect). The kidneys and the inferior vena cava with its tributaries have been removed.

1 Right vagus nerve
2 Right subclavian artery
3 Esophagus
4 Aortic arch
5 Sympathetic trunk
6 Greater splanchnic nerve
7 Intercostal nerve
8 Abdominal part of esophagus and vagal trunk
9 Celiac trunk with celiac ganglion
10 Superior mesenteric artery and ganglion
11 Psoas major muscle and genitofemoral nerve
12 Common iliac artery
13 Superior hypogastric plexus and ganglion
14 Left vagus nerve
15 Brachial plexus
16 Left subclavian artery
17 Left recurrent laryngeal nerve
18 Inferior cervical cardiac nerve
19 Thoracic aorta
20 Esophageal plexus
21 Azygos vein
22 Diaphragm
23 Splenic artery
24 Left renal artery and plexus
25 Inferior mesenteric ganglion and artery
26 Left external iliac artery
27 Superior cervical ganglion of sympathetic trunk
28 Superior cardiac branch of sympathetic trunk
29 Middle cervical ganglion of sympathetic trunk
30 Inferior cervical ganglion of sympathetic trunk
31 Right recurrent laryngeal nerve
32 Lesser splanchnic nerve
33 Lumbar splanchnic nerves
34 Sacral splanchnic nerves
35 Inferior hypogastric ganglion and plexus
36 Left recurrent laryngeal nerve
37 Aorticorenal plexus and renal artery
38 Ganglion impar
39 Esophagus with branches of vagus nerve
40 Hepatic veins
41 Right crus of diaphragm
42 Inferior phrenic artery
43 Right vagus nerve entering the celiac ganglion
44 Right lumbar lymph trunk
45 Lumbar part of right sympathetic trunk
46 Lumbar artery and vein
47 Psoas major muscle
48 Iliac crest
49 Inferior vena cava
50 Iliacus muscle
51 Ureter
52 Left vagus nerve forming the esophageal plexus
53 Left vagus nerve forming the gastric plexus
54 Esophagus continuing into the cardiac part of stomach
55 Lumbocostal triangle
56 Position of twelfth rib
57 Left lumbar lymph trunk
58 Ganglion of sympathetic trunk
59 Quadratus lumborum muscle
60 Lumbar part of left sympathetic trunk
61 Iliac lymph vessels



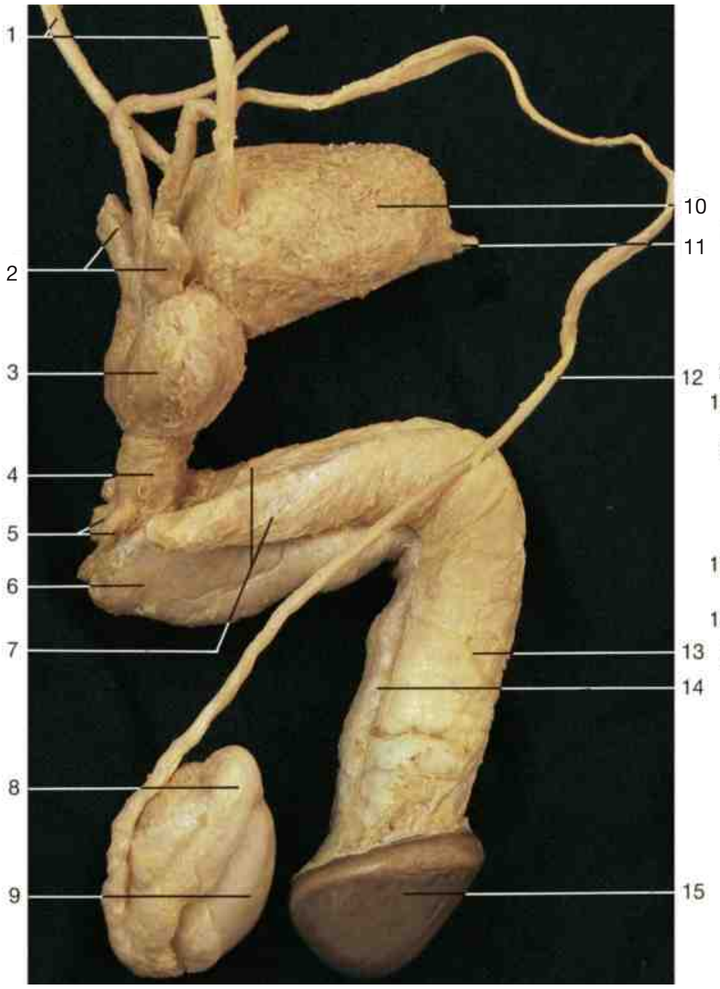
Male urogenital system, midsagittal section through the pelvis.

1	Sigmoid colon
2	Ampulla of rectum
3	Ampulla of ductus deferens
4	External anal sphincter muscle
5	Internal anal sphincter muscle
6	Anal canal
7	Bulb of penis
8	Testis (cut surface)
9	Median umbilical ligament
10	Urinary bladder
11	Internal urethral orifice and sphincter
12	Pubic symphysis
13	Prostatic part of urethra
14	Prostate gland
15	Membranous part of urethra and external urethral sphincter
16	Corpus cavernosum of penis
17	Spongy urethra
18	Corpus spongiosum of penis
19	Foreskin or prepuce
20	Glans penis
21	Kidney
22	Renal pelvis
23	Abdominal part of ureter
24	Pelvic part of ureter
25	Seminal vesicle
26	Ejaculatory duct
27	Bulbo-urethral or Cowper's gland
28	Ductus deferens
29	Epididymis
30	Umbilicus
31	Trigone of bladder and ureteric orifice
32	Navicular fossa of urethra
33	External urethral orifice
34	Testis



Male urogenital system (schematic drawing).

The **prostate** is located between the bladder and urogenital diaphragm. The penis includes the **urethra** and thus serves for both ejaculation and micturition. The internal (involuntary) and external (voluntary) urethral sphincters are widely separated. The **ureter,** having crossed the ductus deferens, enters the urinary bladder at its base. The peritoneum is reflected off of the posterior surface of the bladder and onto the rectum, thus forming the rectovesical pouch.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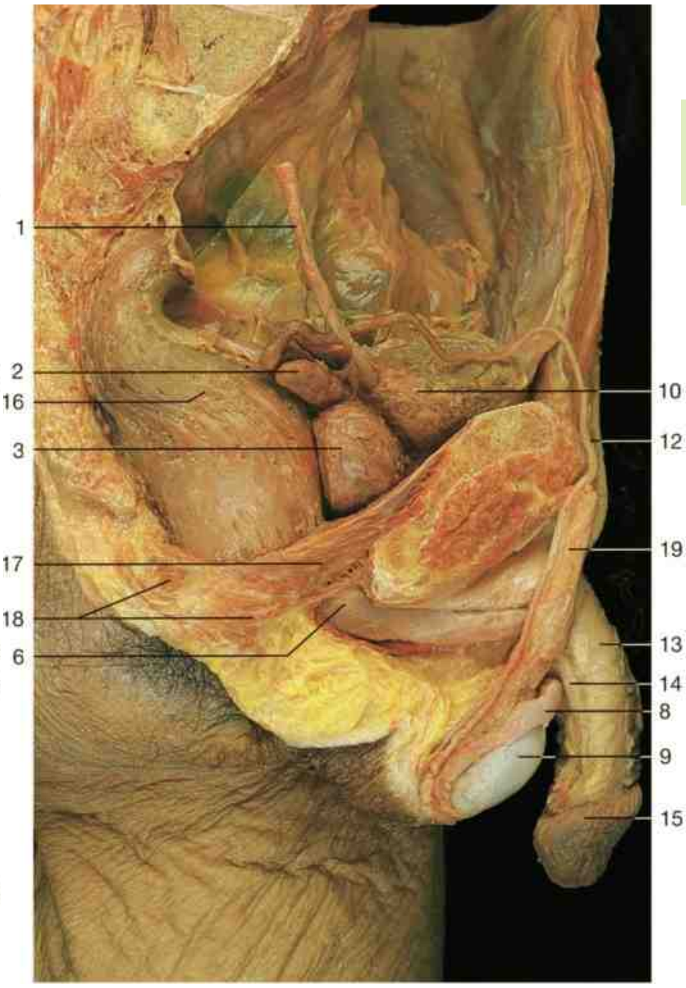
Male genital organs, isolated (right lateral aspect).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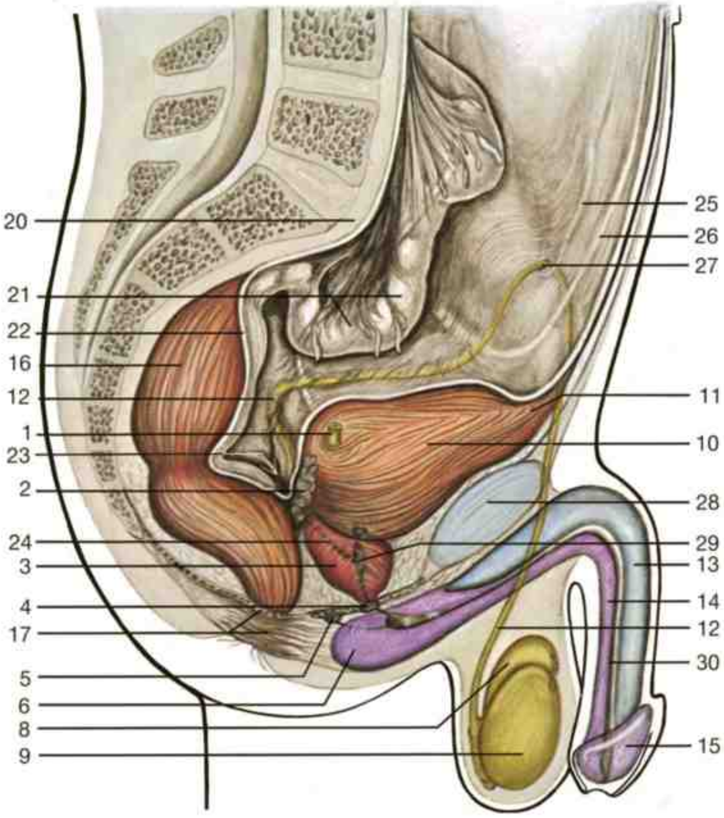
Male genital organs in situ (right lateral aspect).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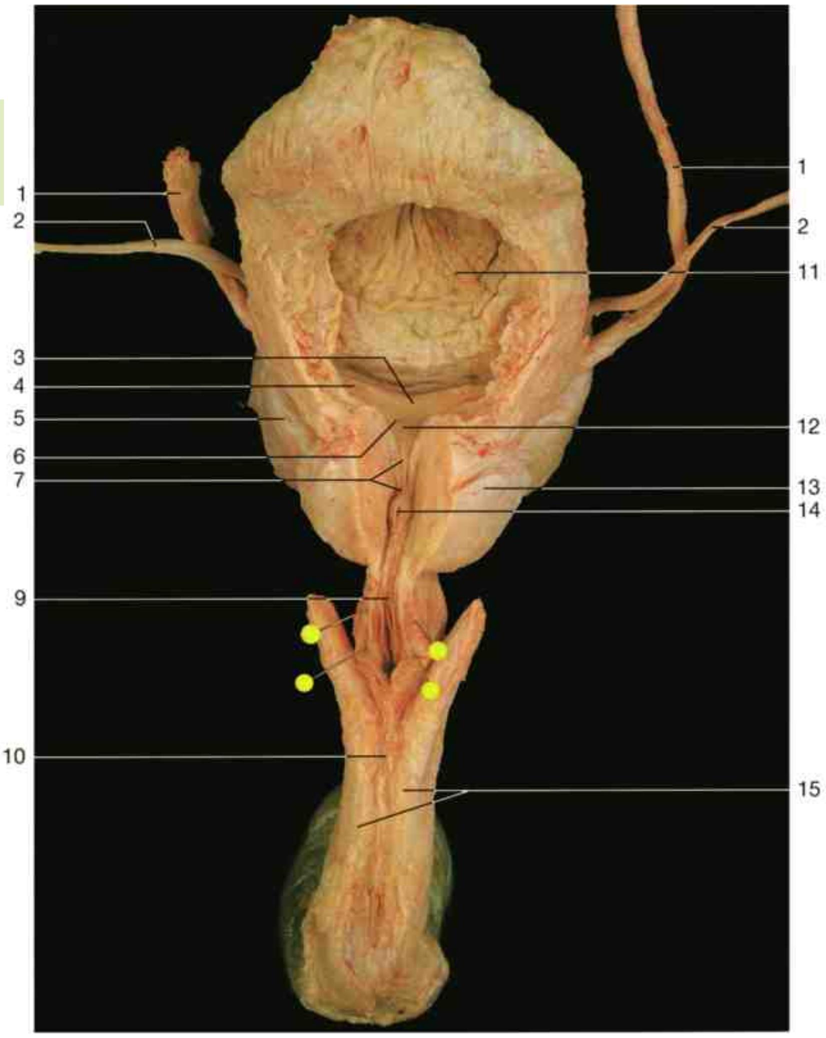
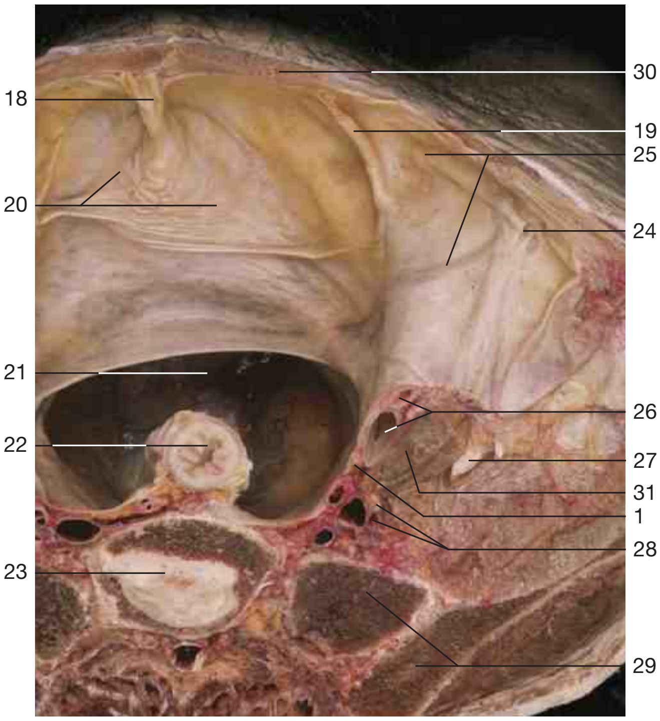
Positions of male genital organs (right lateral aspect).
(Schematic drawing.)

1 Ureter
2 Seminal vesicle
3 Prostate gland
4 Urogenital diaphragm and membranous part of urethra
5 Bulbo-urethral or Cowper's gland
6 Bulb of penis
7 Left and right crus penis
8 Epididymis
9 Testis
10 Urinary bladder
11 Apex of urinary bladder
12 Ductus deferens
13 Corpus cavernosum of penis
14 Corpus spongiosum of penis
15 Glans penis
16 Ampulla of rectum
17 Levator ani muscle
18 Anal canal and external anal sphincter muscle
19 Spermatic cord (cut)
20 Sacral promontory
21 Sigmoid colon
22 Peritoneum (cut edge)
23 Rectovesical pouch
24 Ejaculatory duct
25 Lateral umbilical fold
26 Medial umbilical fold
27 Deep inguinal ring and ductus deferens
28 Pubic symphysis
29 Prostatic part of urethra
30 Spongy urethra

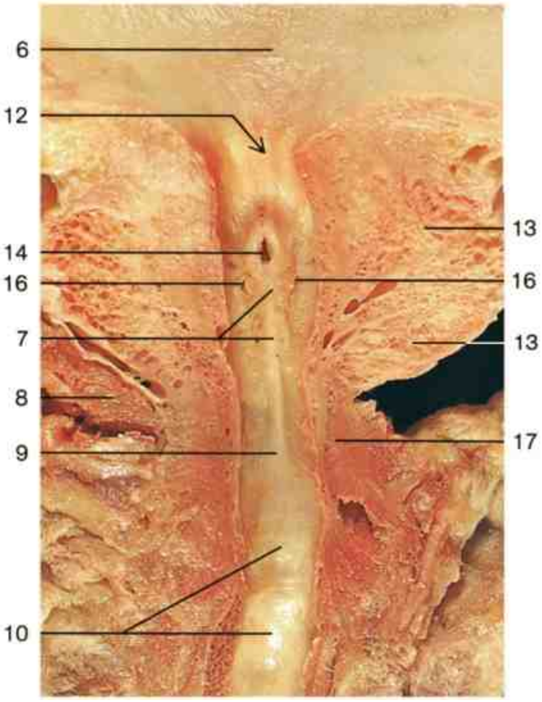


Male urogenital organs, isolated (anterior aspect). Urinary bladder, prostate, and urethra have been opened. The urinary bladder is contracted.

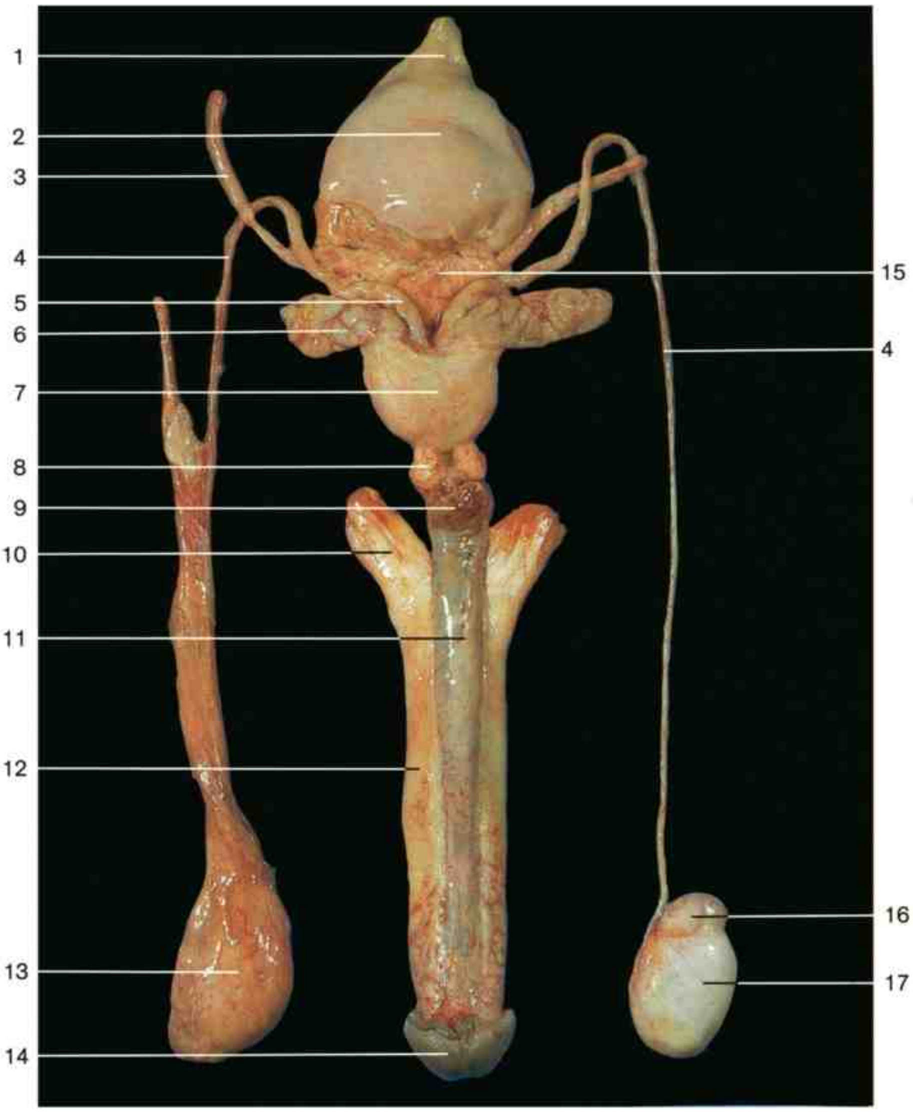
1	Ureter
2	Ductus deferens
3	Interureteric fold
4	Ureteric orifice
5	Seminal vesicle
6	Trigone of bladder
7	Prostatic urethra with seminal colliculus and urethral crest
8	Deep transverse perineal muscle
9	Membranous urethra
10	Spongy urethra
11	Mucous membrane of urinary bladder
12	Internal urethral orifice and uvula of bladder
13	Prostate
14	Prostatic utricle
15	Right and left corpus cavernosum of penis
16	Ejaculatory duct
17	Sphincter urethrae muscle
18	Median umbilical fold with remnant of urachus
19	Medial umbilical fold with remnant of umbilical artery
20	Urinary bladder
21	Rectovesical pouch
22	Rectum
23	Sacrum
24	Deep iliac circumflex artery
25	Deep inguinal ring and ductus deferens
26	External iliac artery and vein
27	Femoral nerve
28	Obturator nerve and internal iliac artery
29	Ilium and sacrum
30	Inferior epigastric artery
31	Iliopsoas muscle



Pelvic cavity in the male (viewed from above).

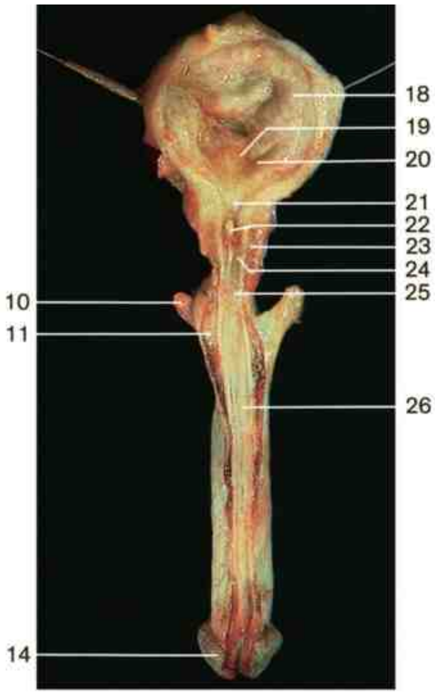


Posterior half of male urethra and prostate in continuity with neck of bladder (anterior aspect).

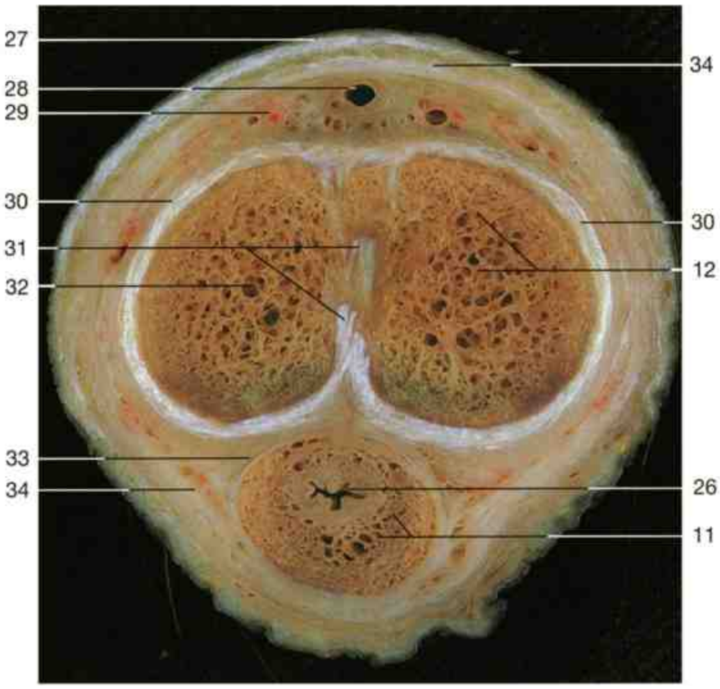


Male genital organs, isolated (posterior aspect).

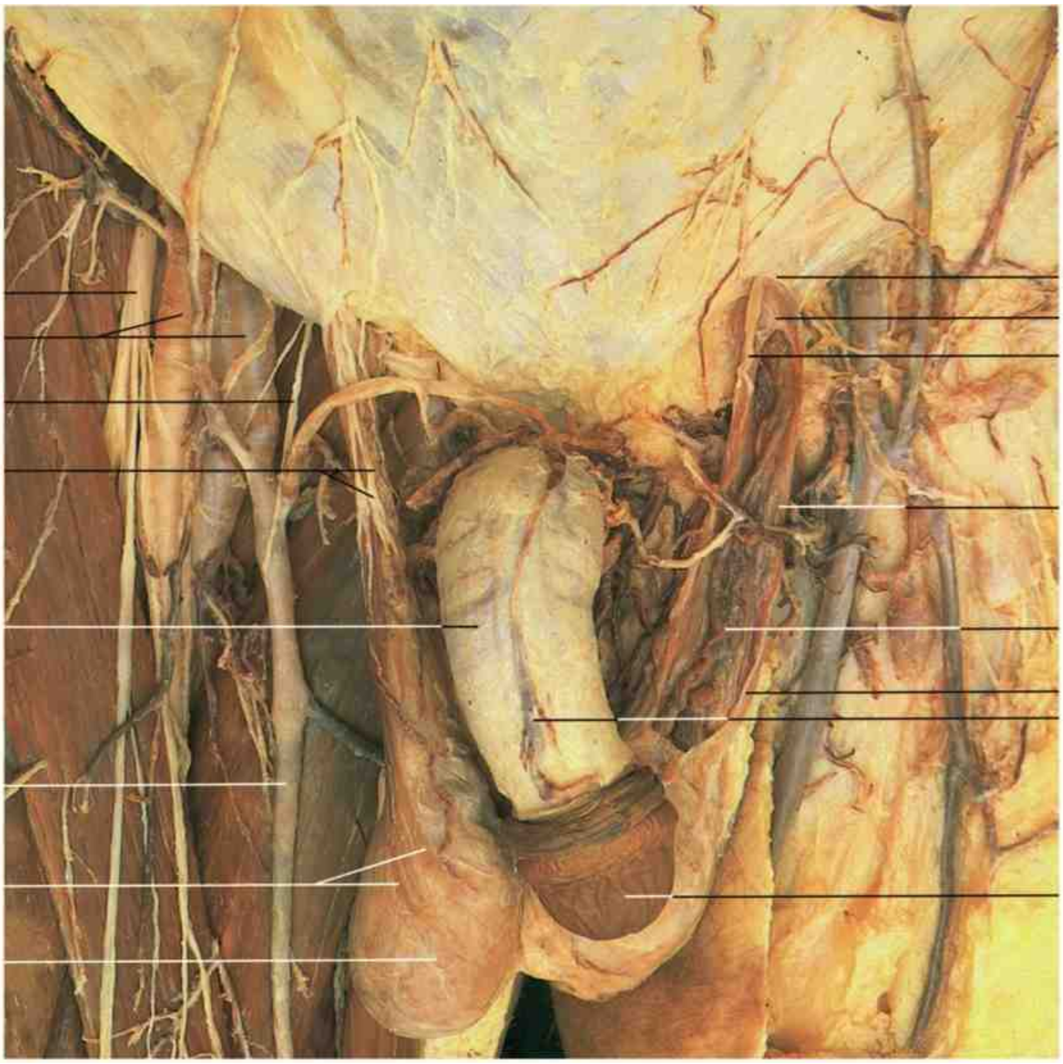
1 Apex of urinary bladder with urachus
2 Urinary bladder
3 Ureter
4 Ductus deferens
5 Ampulla of ductus deferens
6 Seminal vesicle
7 Prostate
8 Bulbo-urethral or Cowper's gland
9 Bulb of penis
10 Crus penis
11 Corpus spongiosum of penis
12 Corpus cavernosum of penis
13 Testis and epididymis with coverings
14 Glans penis
15 Fundus of bladder
16 Head of epididymis
17 Testis
18 Mucous membrane of bladder
19 Trigone of bladder
20 Ureteric orifice
21 Internal urethral orifice
22 Seminal colliculus
23 Prostate
24 Prostatic urethra
25 Membranous urethra
26 Spongy (penile) urethra
27 Skin of penis
28 Deep dorsal vein of penis (unpaired)
29 Dorsal artery of penis (paired)
30 Tunica albuginea of corpora cavernosa
31 Septum of penis
32 Deep artery of penis
33 Tunica albuginea of corpus spongiosum
34 Deep fascia of penis



Urinary bladder, urethra, and penis (anterior aspect, opened longitudinally).



Cross section of penis (inferior aspect).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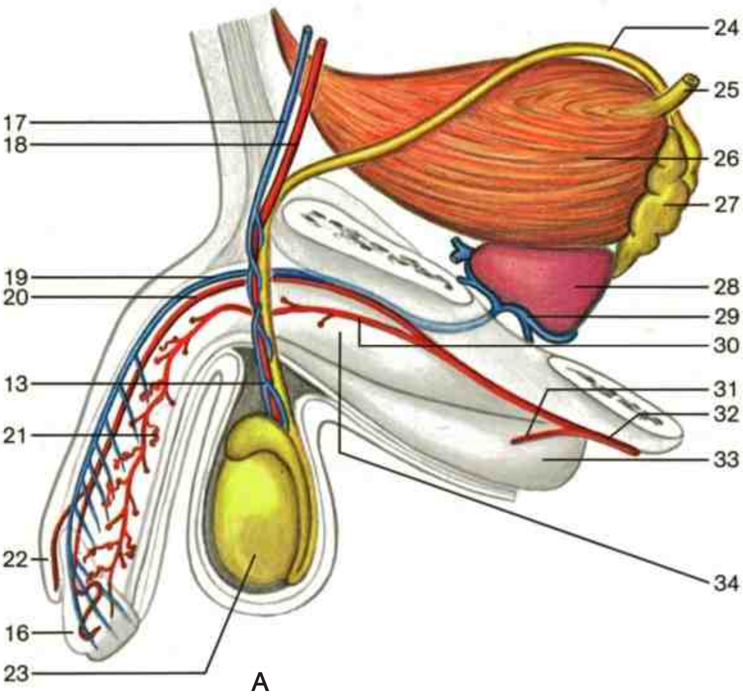
Male external genital organs with penis, testis, and spermatic cord, superficial layers (anterior aspect).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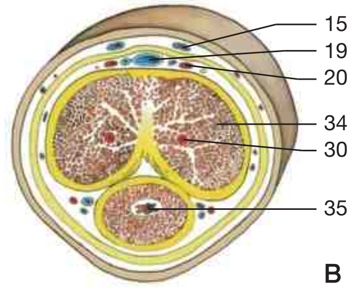
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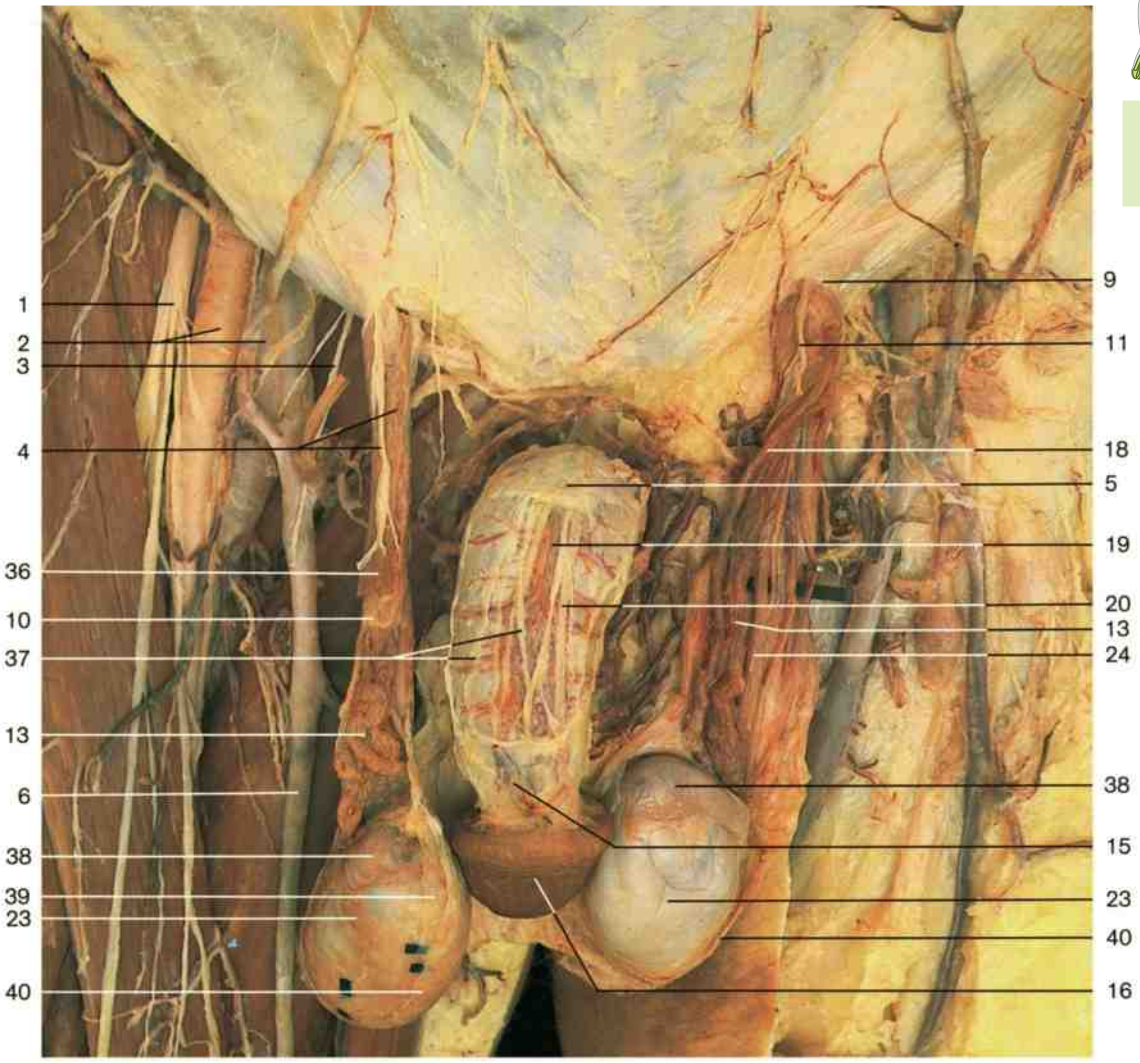
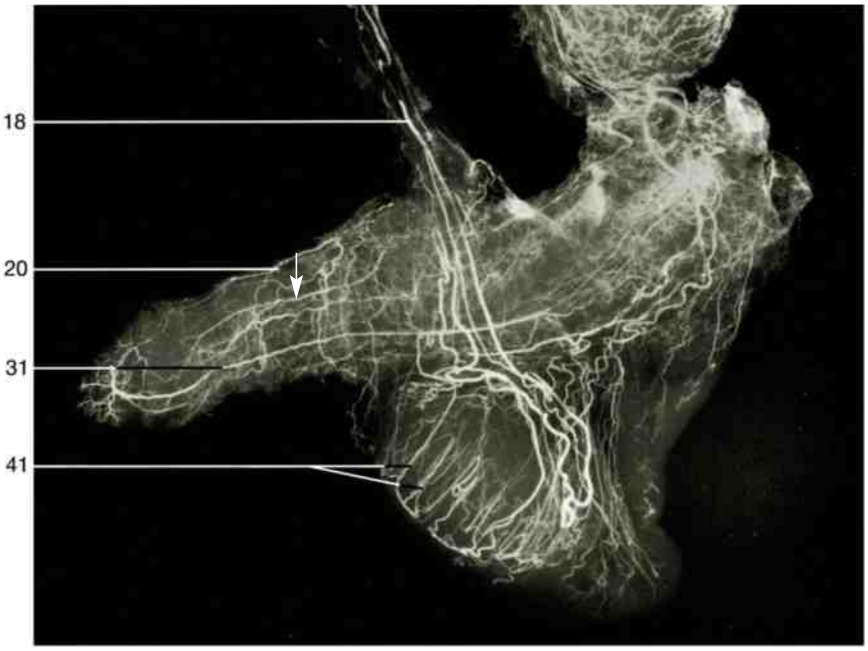
Vessels of male genital organs (schematic drawing).
A = lateral aspect; B = cross section of penis.

1 Femoral nerve
2 Femoral artery and vein
3 Femoral branch of genitofemoral nerve
4 Spermatic cord with genital branch of genitofemoral nerve
5 Penis with deep fascia
6 Great saphenous vein
7 Cremaster muscle
8 Testis with cremaster muscle
9 Superficial inguinal ring
10 Internal spermatic fascia (cut edge)
11 Ilio-inguinal nerve
12 Left spermatic cord
13 Pampiniform venous plexus
14 External spermatic fascia
15 Superficial dorsal vein of penis

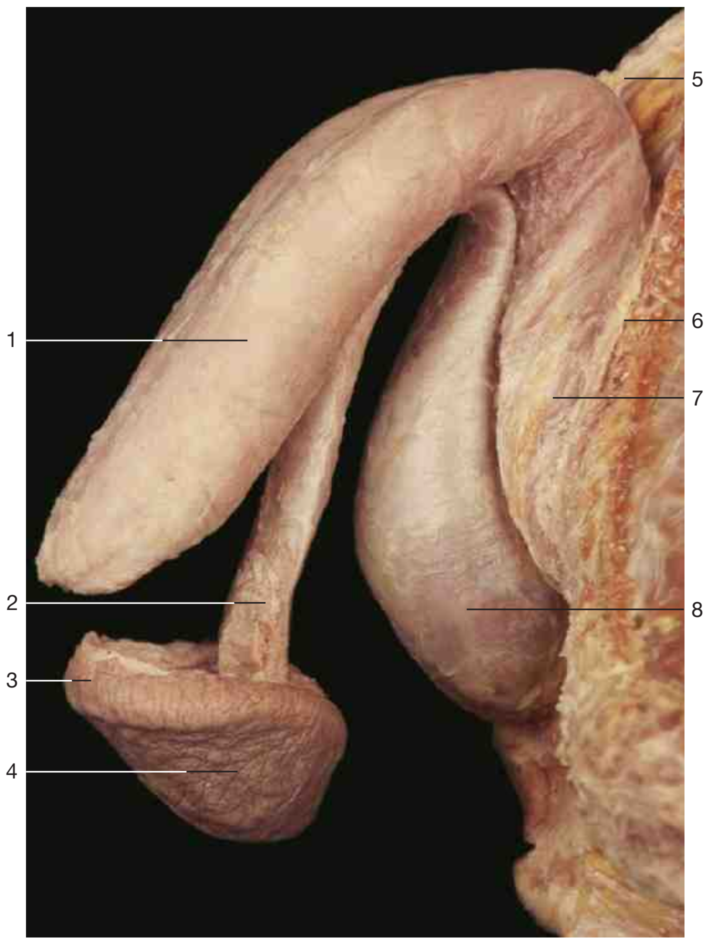


Male external genital organs with penis, testis, and spermatic cord, deeper layers (anterior aspect). The deep fascia of the penis has been opened to display the dorsal nerves and vessels.

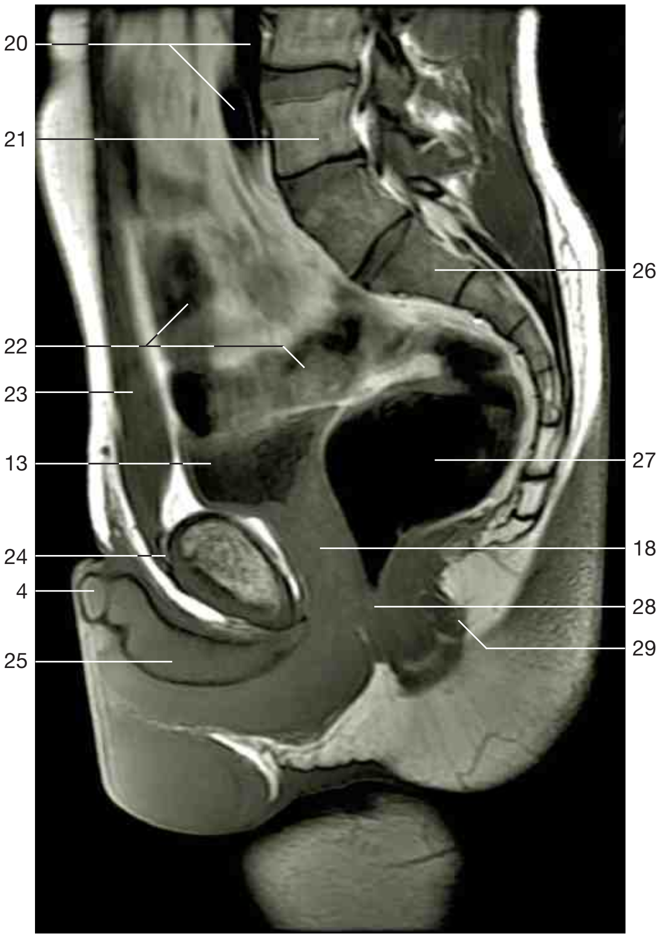
16	Glans penis
17	Testicular vein
18	Testicular artery
19	Deep dorsal vein of penis
20	Dorsal artery of penis
21	Helicine arteries
22	Prepuce
23	Testis with tunica albuginea
24	Ductus deferens
25	Ureter
26	Urinary bladder
27	Seminal vesicle
28	Prostate
29	Vesicoprostatic venous plexus
30	Deep artery of penis
31	Artery of bulb of penis
32	Internal pudendal artery
33	Corpus spongiosum of penis
34	Corpus cavernosum of penis
35	Urethra
36	Cremasteric fascia with cremaster muscle
37	Dorsal nerve of penis
38	Epididymis
39	Tunica vaginalis (visceral layer)
40	Tunica vaginalis (parietal layer)
41	Testis with vascular loops



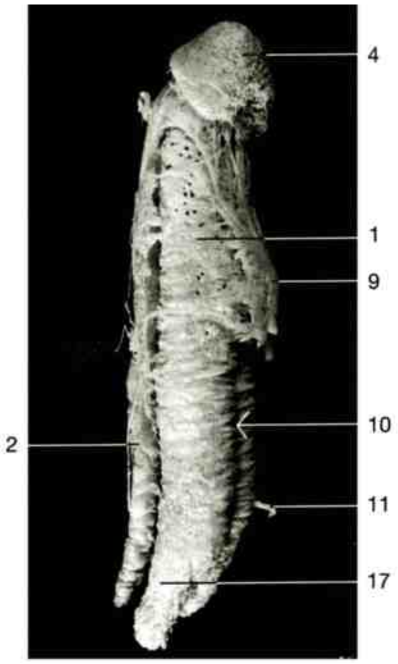
Male genital organs (arteriography, lateral aspect). Arrow = helicine artery.



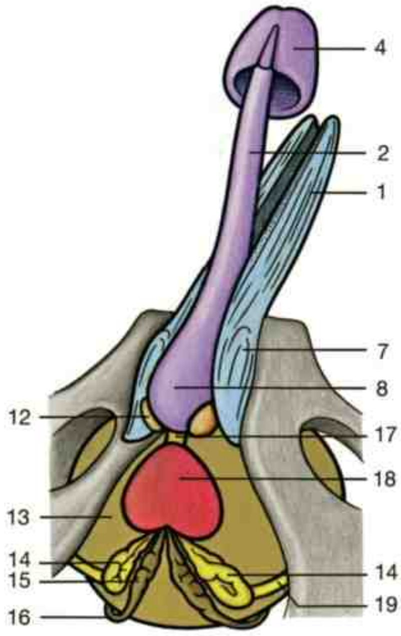
Male external genital organs (lateral aspect). The corpus spongiosum of the penis with the glans penis has been isolated and reflected.



Sagittal section of the pelvic cavity with the male genital organs (MRI scan; from Heuck et al., MRT-Atlas, 2009).

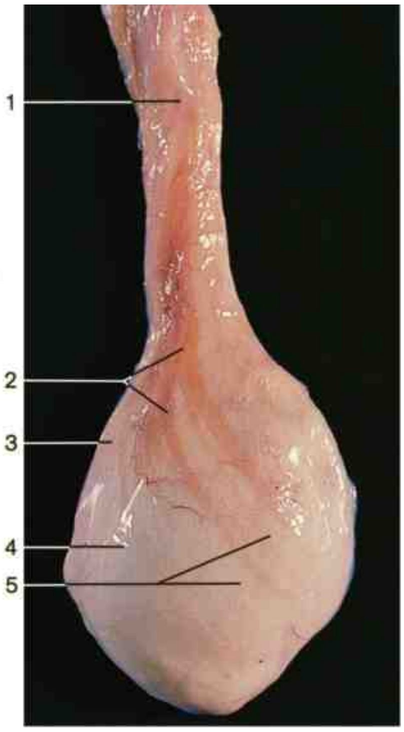


Resin cast of erected penis.

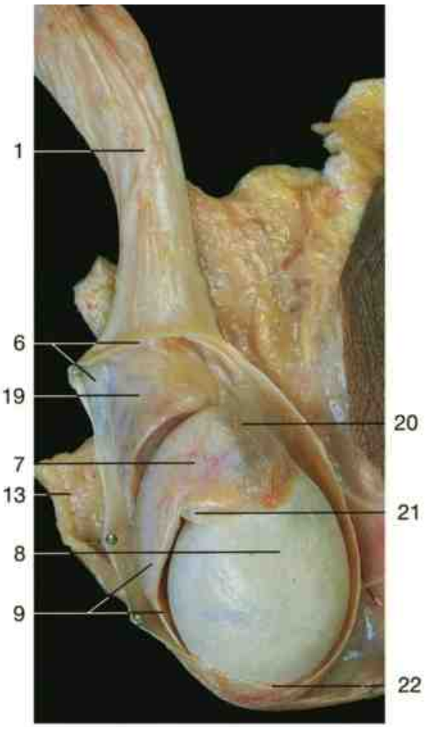


Male external genital organs and accessory glands (schematic drawing).

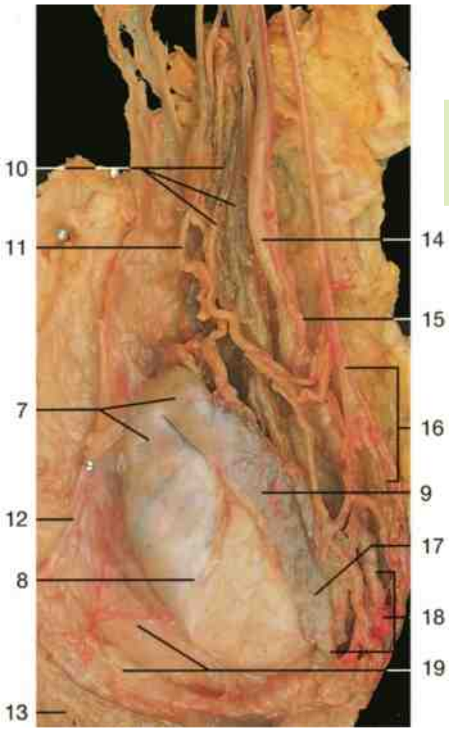
1 Corpus cavernosum of penis
2 Corpus spongiosum of penis
3 Corona of glans penis
4 Glans penis
5 Suspensory ligament of penis
6 Inferior pubic ramus
7 Crus penis
8 Bulb of penis
9 Deep dorsal vein of penis
10 Septum pectiniforme
11 Dorsal artery of penis
12 Bulbo-urethral or Cowper’s gland
13 Urinary bladder
14 Seminal vesicle
15 Ampulla of ductus deferens
16 Ductus deferens
17 Membranous urethra
18 Prostate
19 Ureter
20 Common iliac artery and vein
21 Fifth lumbar vertebral body
22 Intestinal loops
23 Rectus abdominis muscle
24 Pubic symphysis
25 Root of penis
26 Sacral bone
27 Ampulla of rectum
28 Anal canal
29 External anal sphincter muscle



Testis and epididymis with investing layers (lateral aspect).

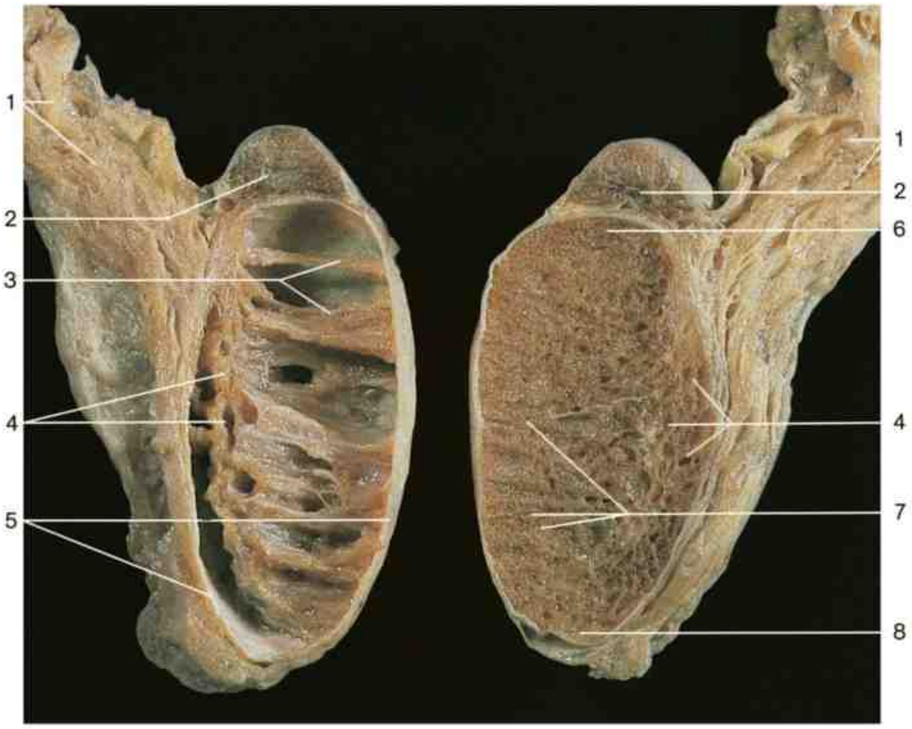


Testis and epididymis (lateral aspect). The tunica vaginalis has been opened.



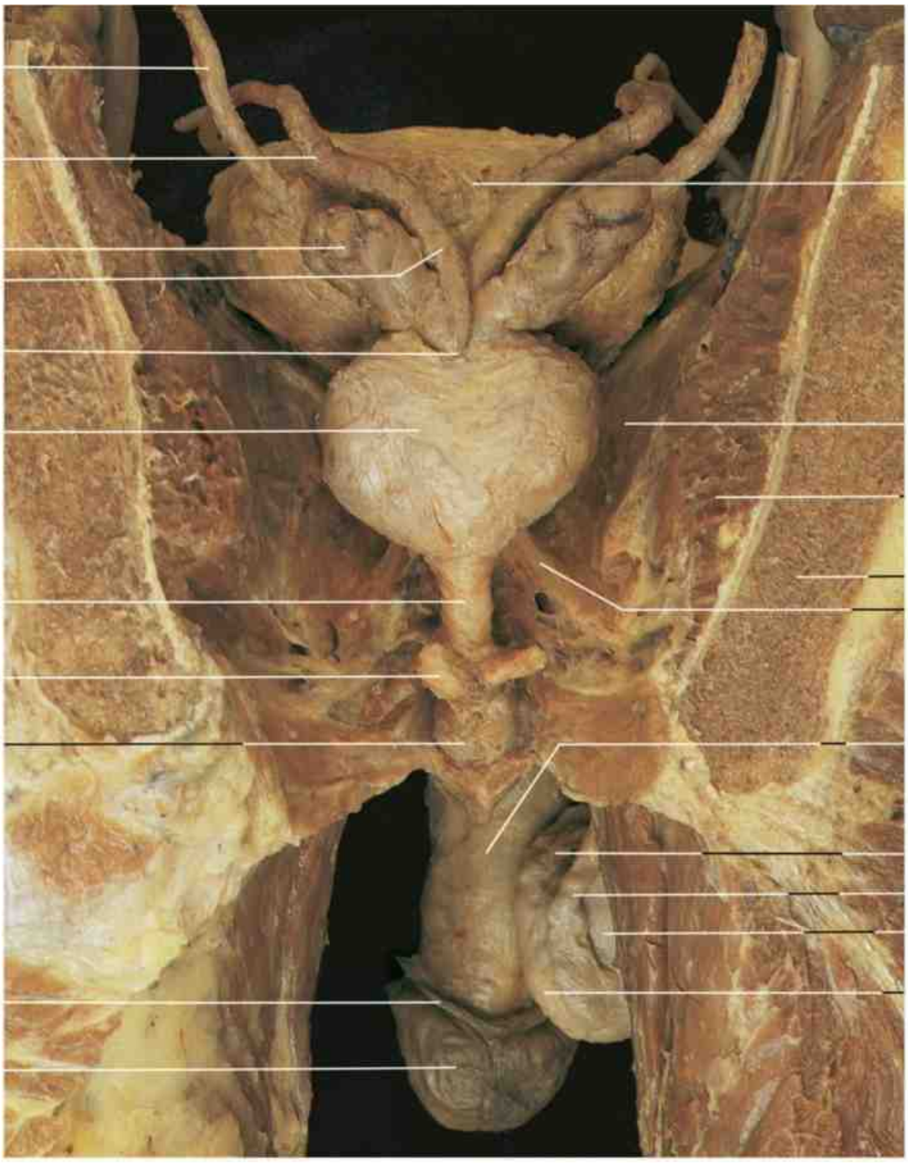
Testis, epididymis, and spermatic cord (left side, posterolateral aspect). Dissection of spermatic cord and ductus deferens.

1 Spermatic cord covered with cremasteric fascia
2 Cremaster muscle
3 Position of epididymis
4 Internal spermatic fascia
5 Position of testis
6 Internal spermatic fascia with adjacent investing layers of testis (cut surface)
7 Head of epididymis
8 Testis with tunica vaginalis (visceral layer)
9 Body of epididymis
10 Pampiniform venous plexus (anterior veins)
11 Testicular artery
12 Tunica vaginalis (parietal layer, cut edge)
13 Skin and dartos muscle (reflected)
14 Ductus deferens
15 Artery of ductus deferens
16 Posterior veins of pampiniform plexus
17 Tail of epididymis
18 Transition of epididymal duct to ductus deferens and venous plexus
19 Parietal layer of tunica vaginalis
20 Appendix of epididymis
21 Appendix of testis
22 Gubernaculum testis



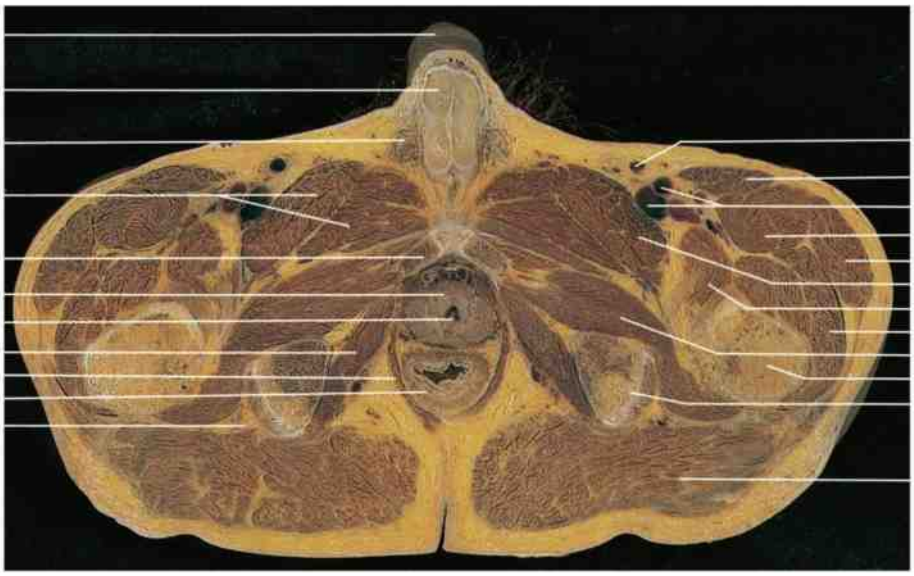
Longitudinal section through testis and epididymis. The left figure shows the testicular septa after removal of the seminiferous tubules.

1 Spermatic cord (cut surface)
2 Head of epididymis (cut surface)
3 Septa of testis
4 Mediastinum testis
5 Tunica albuginea
6 Superior pole of testis
7 Convoluted seminiferous tubules
8 Inferior pole of testis

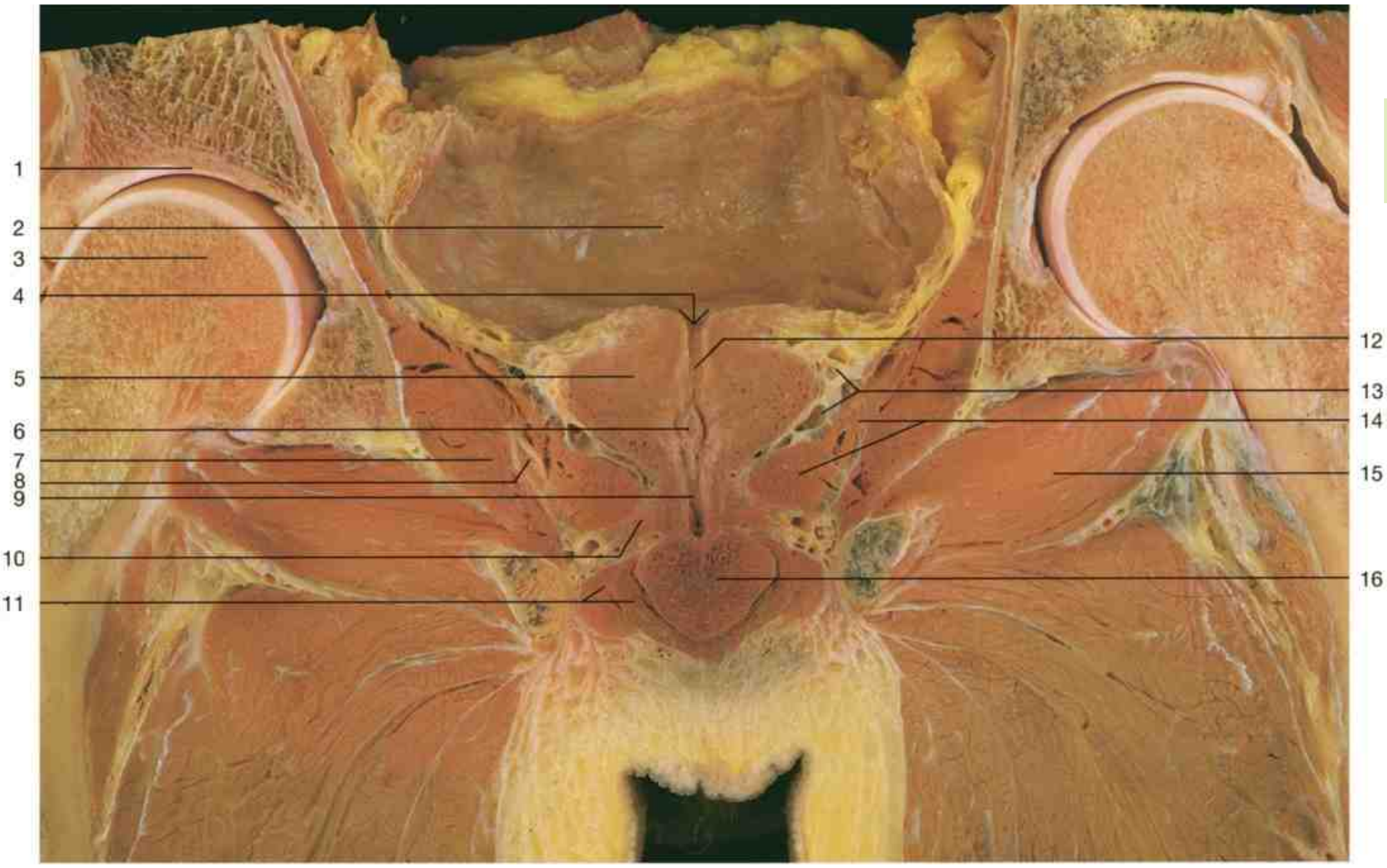


Accessory glands of male genital organs in situ. Coronal section through the pelvic cavity. Posterior aspect of urinary bladder, prostate, and seminal vesicles.

1 Ureter
2 Ductus deferens
3 Seminal vesicle
4 Ampulla of ductus deferens
5 Ejaculatory duct (proximal portion)
6 Prostate
7 Membranous urethra
8 Bulbo-urethral or Cowper's gland
9 Bulb of penis
10 Penis
11 Glans penis
12 Urinary bladder
13 Levator ani muscle
14 Obturator internus muscle
15 Pelvic bone (cut edge)
16 Puboprostatic ligament
17 Corpus spongiosum of penis
18 Head of epididymis
19 Beginning of ductus deferens
20 Testis
21 Tail of epididymis
22 Corpus cavernosum of penis
23 Spermatic cord
24 Pectineus and adductor muscles
25 Pubic bone
26 Prostatic part of urethra (seminal colliculus)
27 Rectum
28 Sciatic nerve
29 Great saphenous vein
30 Sartorius muscle
31 Femoral artery and vein
32 Rectus femoris muscle
33 Tensor fasciae latae muscle
34 Pectineus muscle
35 Iliopsoas muscle
36 Vastus lateralis muscle
37 Obturator externus muscle
38 Femur
39 Ischial tuberosity
40 Gluteus maximus muscle

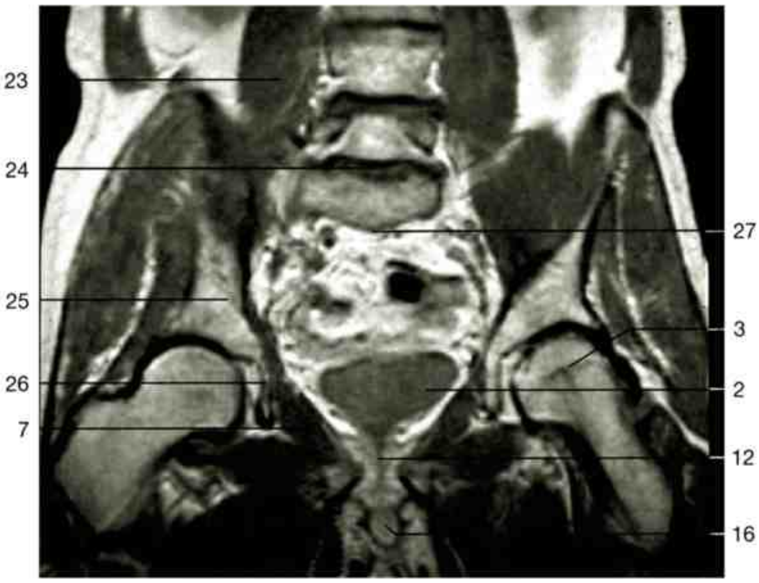


Horizontal section through pelvic cavity at the level of prostate.

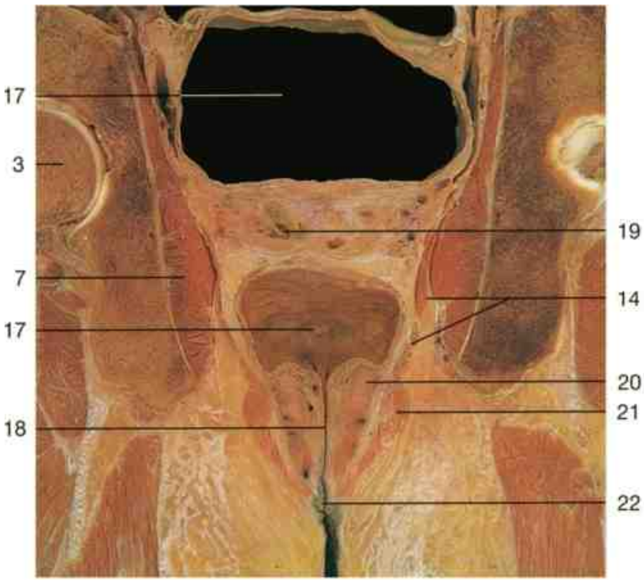


Coronal section through pelvic cavity at the level of prostate and hip joint (anterior aspect).

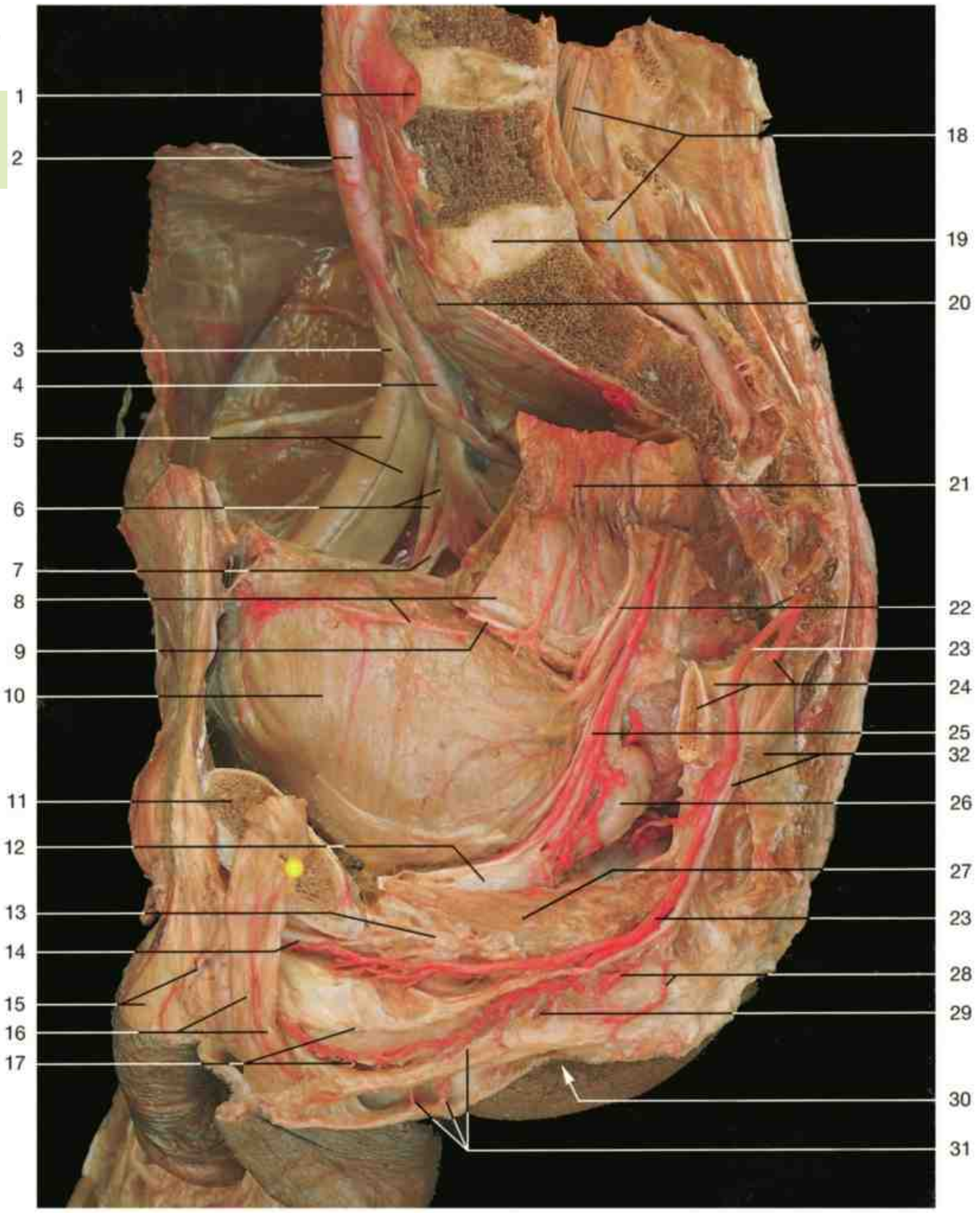
1 Acetabulum of hip joint
2 Urinary bladder
3 Head of femur
4 Internal urethral orifice
5 Prostate
6 Seminal colliculus
7 Obturator internus muscle
8 Ischiorectal fossa
9 Membranous urethra
10 Deep transverse perineus muscle
11 Crus penis and ischiocavernosus muscle
12 Prostatic part of urethra
13 Prostatic plexus
14 Levator ani muscle
15 Obturator externus muscle
16 Bulb of penis
17 Ampulla of rectum
18 Anal canal
19 Seminal vesicle
20 Internal anal sphincter muscle
21 External anal sphincter muscle
22 Anus
23 Psoas major muscle
24 Intervertebral disc
25 Ilium
26 Ligament of the head of the femur
27 Sacral promontory



Coronal section through pelvic cavity (MRI scan).

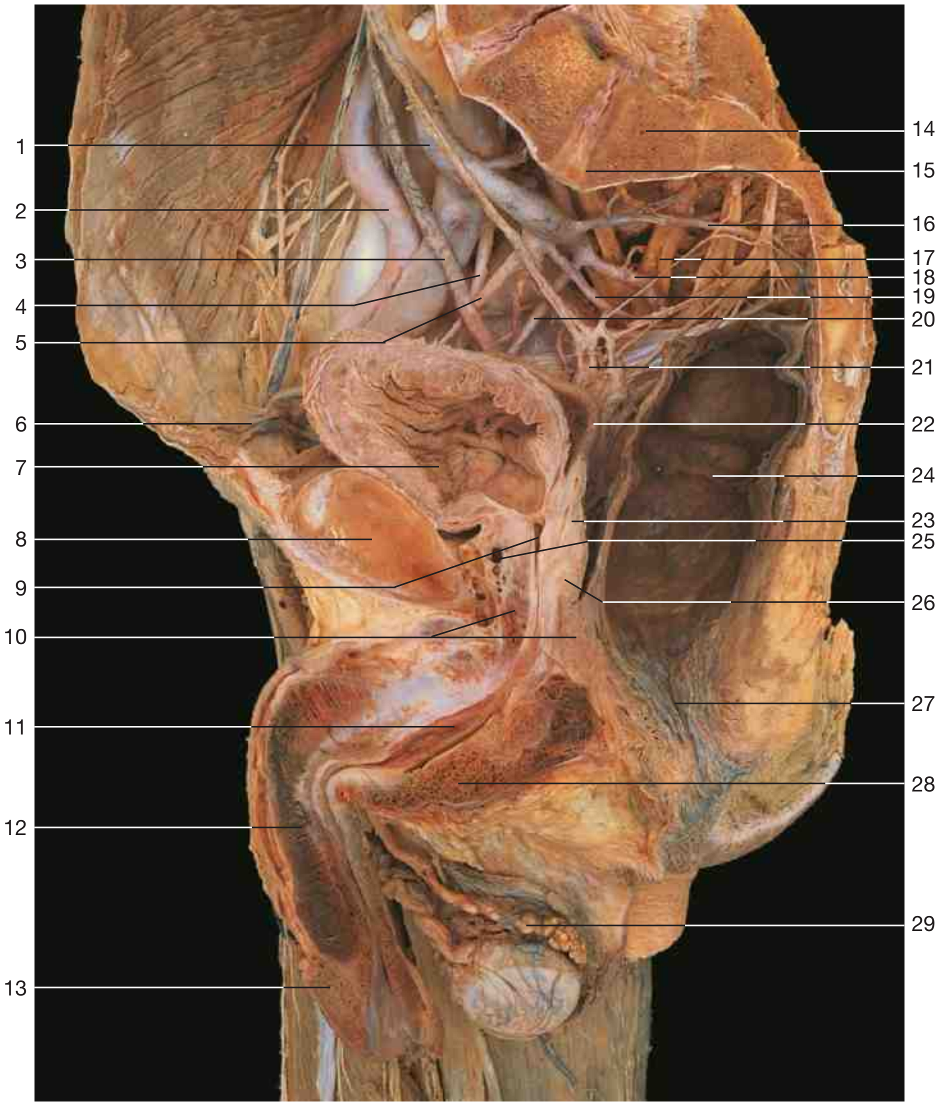


Coronal section through anal canal.



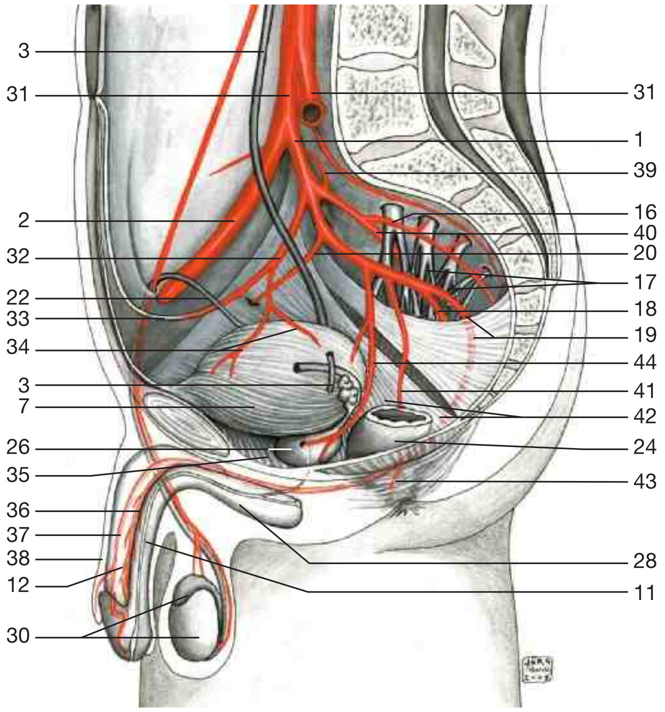
Pelvic cavity in the male (right half of parasagittal section). The arteries have been injected with red resin. The parietal layer of peritoneum has been removed. The urinary bladder is filled to a great extent.

1 Left common iliac artery
2 Right common iliac artery
3 Right ureter
4 Right internal iliac artery
5 Right external iliac artery and vein
6 Right obturator artery and nerve
7 Umbilical artery
8 Sigmoid and superior vesical artery
9 Left ductus deferens
10 Urinary bladder
11 Pubic bone (cut)
12 Prostate
13 Vesicoprostatic venous plexus
14 Deep dorsal vein of penis and dorsal artery of penis
15 Penis and superficial dorsal vein
16 Spermatic cord and testicular artery
17 Bulb of penis and deep artery of penis
18 Cauda equina and dura mater (divided)
19 Intervertebral disc between fifth lumbar vertebra and sacrum
20 Sacral promontory
21 Mesosigmoid
22 Left ureter
23 Left internal pudendal artery
24 Ischial spine (cut), sacrospinal ligament, inferior gluteal artery
25 Left inferior vesical artery
26 Seminal vesicle
27 Levator ani muscle
28 Branches of inferior rectal artery
29 Perineal artery
30 Anus
31 Posterior scrotal branches
32 Pudendal nerve and sacrotuberal ligament

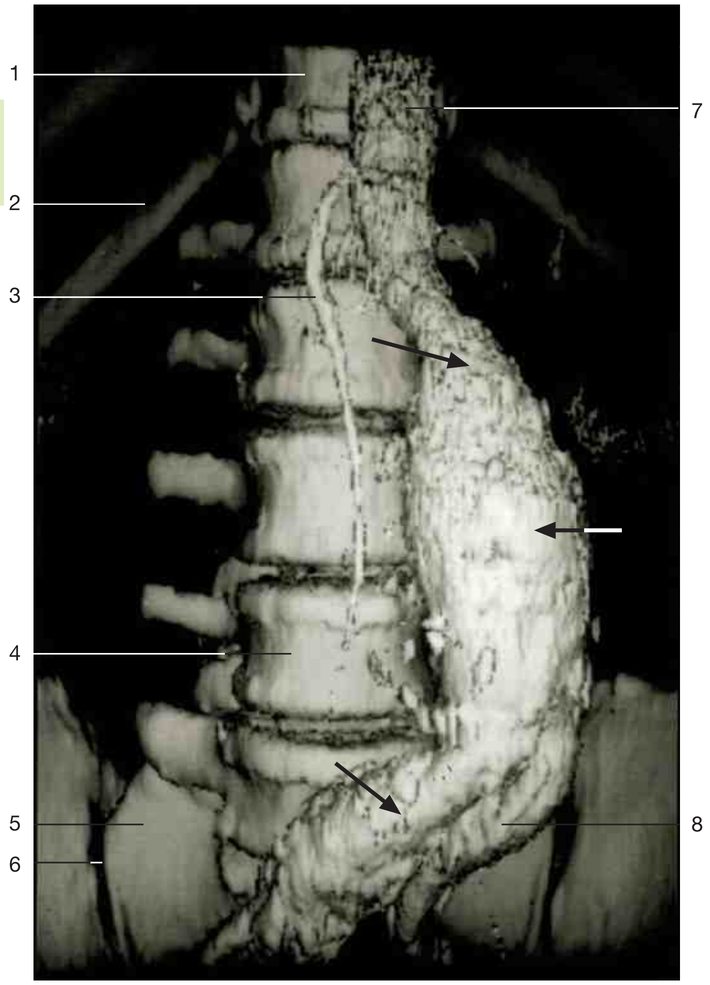


Vessels of the pelvic cavity in the male (medial aspect, midsagittal section). The gluteus maximus muscle has been removed.

1 Internal iliac artery
2 External iliac artery
3 Ureter
4 Obturator nerve
5 Umbilical artery
6 Anulus inguinalis profundus (deep inguinal ring)
7 Urinary bladder (vesica urinaria)
8 Symphysis
9 Prostatic part of urethra
10 Sphincter muscle of urethra
11 Urethra (spongy part)
12 Cavernous body of penis
13 Glans penis
14 Sacrum
15 Promontory
16 Lateral sacral artery
17 Plexus sacralis
18 Inferior gluteal artery
19 Internal pudendal artery
20 Obturator artery
21 Inferior hypogastric plexus
22 Ductus deferens
23 Seminal vesicle (vesicula seminalis)
24 Rectum
25 Prostatic venous plexus
26 Prostate
27 Anal canal
28 Spongy part of penis
29 Pampiniform plexus
30 Testis and epididymis
31 Common iliac artery
32 Umbilical artery
33 Medial umbilical ligament
34 Branches of superior vesical artery
35 Urogenital diaphragm
36 Deep artery of penis
37 Dorsal artery of penis
38 Penis
39 Iliolumbar artery
40 Superior gluteal artery
41 Middle rectal artery
42 Levator ani muscle
43 Inferior rectal artery
44 Inferior vesical artery

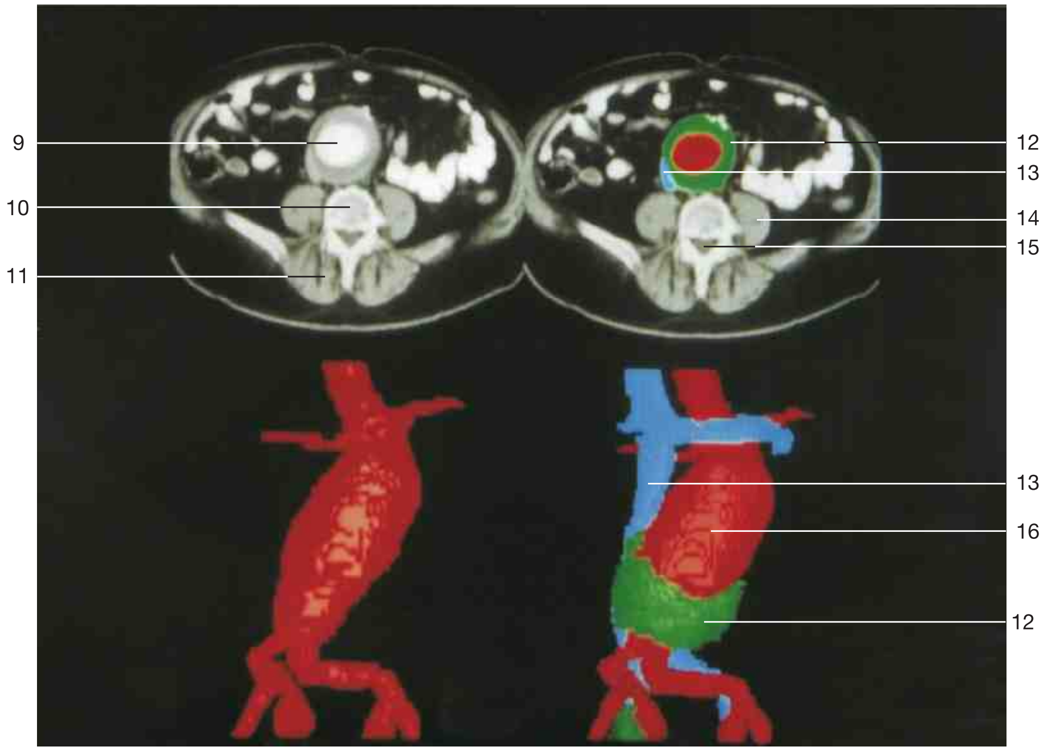


Main branches of internal iliac artery in the male (schematic drawing).

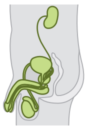


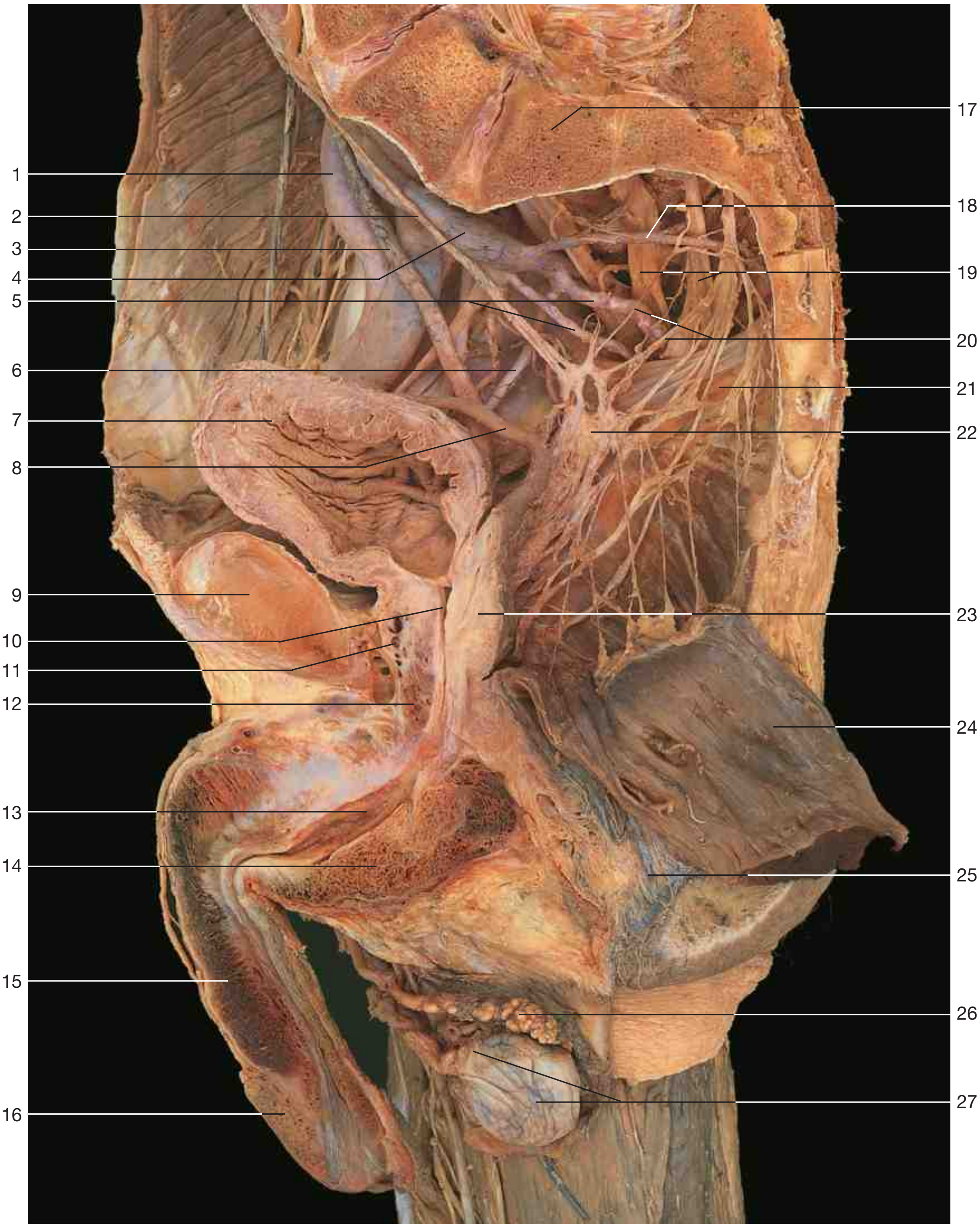
1 Twelfth thoracic vertebra (T_{12})
2 Twelfth rib (rib XII)
3 Inferior mesenteric artery
4 Fourth lumbar vertebra (L_4)
5 Sacrum
6 Sacro-iliac articulation
7 Aorta (abdominal part)
8 Left common iliac artery (included into the aneurysm)
9 Aorta with aneurysm
10 Body of lumbar vertebra
11 Intrinsic muscles of the back
12 Thrombotic part of the aneurysm (green)
13 Inferior vena cava (compressed, blue)
14 Iliopsoas muscle
15 Vertebral canal
16 Aneurysm of the aorta (red)

Abdominal part of the aorta showing an infrarenal aneurysm with involvement of both iliac arteries (arrows) (3-D reconstruction, courtesy of Prof. H. Rupprecht and Dr. M. Rexer, Klinikum Fürth, Germany).



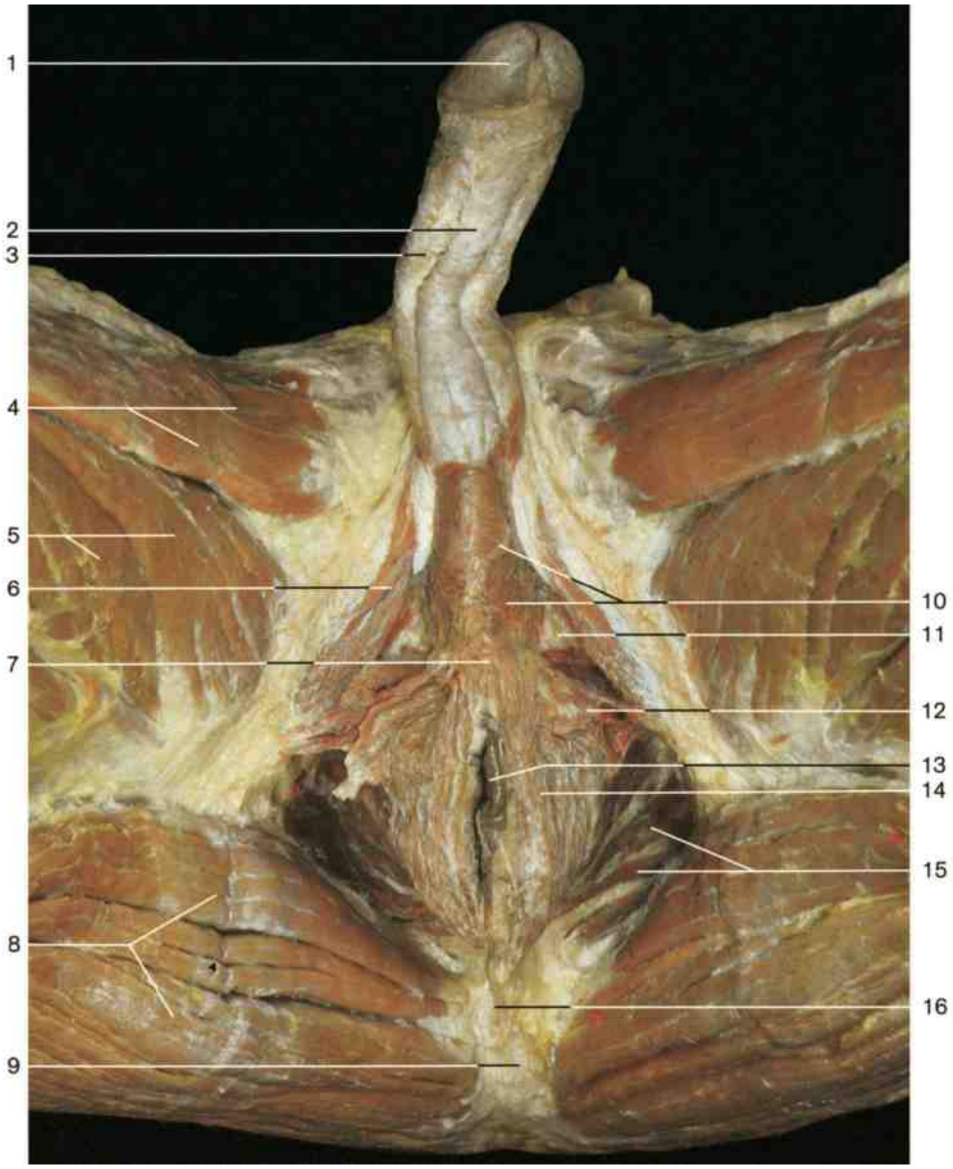
Abdominal part of the aorta with an aneurysm, after injection of contrast medium. Above = horizontal sections through the abdominal cavity, showing different contrast medium concentrations within the aorta and the aneurysm; below = 3-D reconstruction of the aneurysm; red = aorta; green = thrombotic areas; blue = vein (vena cava inferior, partly compressed).





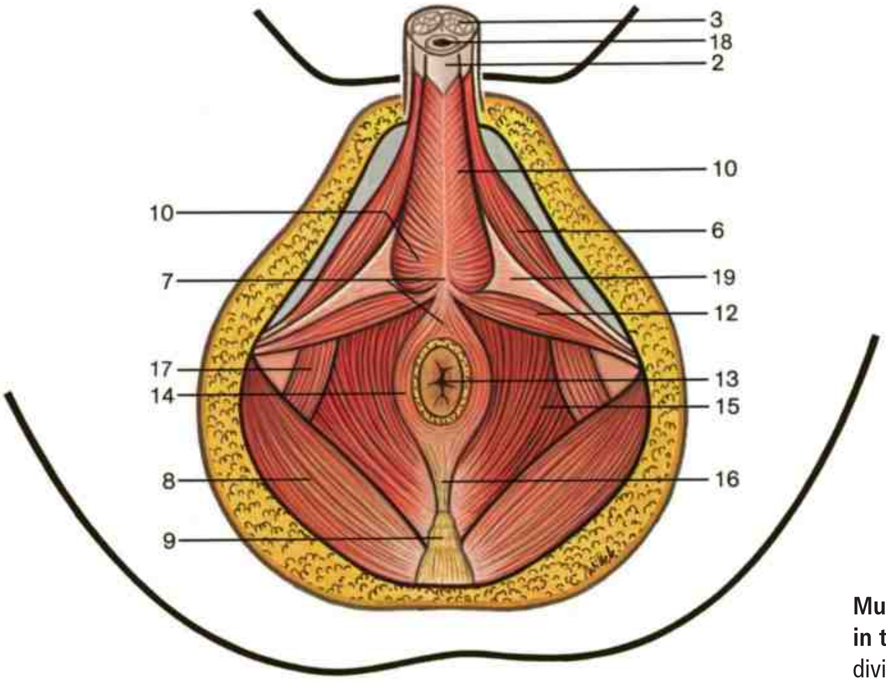
Vessels and nerves of the pelvic cavity in the male (medial aspect, midsagittal section). Rectum reflected to display the inferior hypogastric plexus.

1 External iliac artery
2 Right hypogastric nerve
3 Ureter
4 Internal iliac artery
5 Inferior gluteal artery and internal pudendal artery
6 Obturator artery
7 Urinary bladder
8 Ductus deferens
9 Symphysis pubica
10 Prostatic part of urethra
11 Prostatic venous plexus
12 Sphincter urethrae muscle
13 Spongy part of urethra
14 Corpus spongiosum penis
15 Corpus cavernosum penis
16 Glans penis
17 Sacrum
18 Lateral sacral artery
19 Sacral plexus
20 Pelvic splanchnic nerves (nervi erigentes)
21 Levator ani muscle
22 Inferior hypogastric plexus (pelvic plexus)
23 Prostate
24 Rectum (reflected)
25 Anal canal and external anal sphincter
26 Pampiniform plexus continuous with testicular vein
27 Testis and epididymis

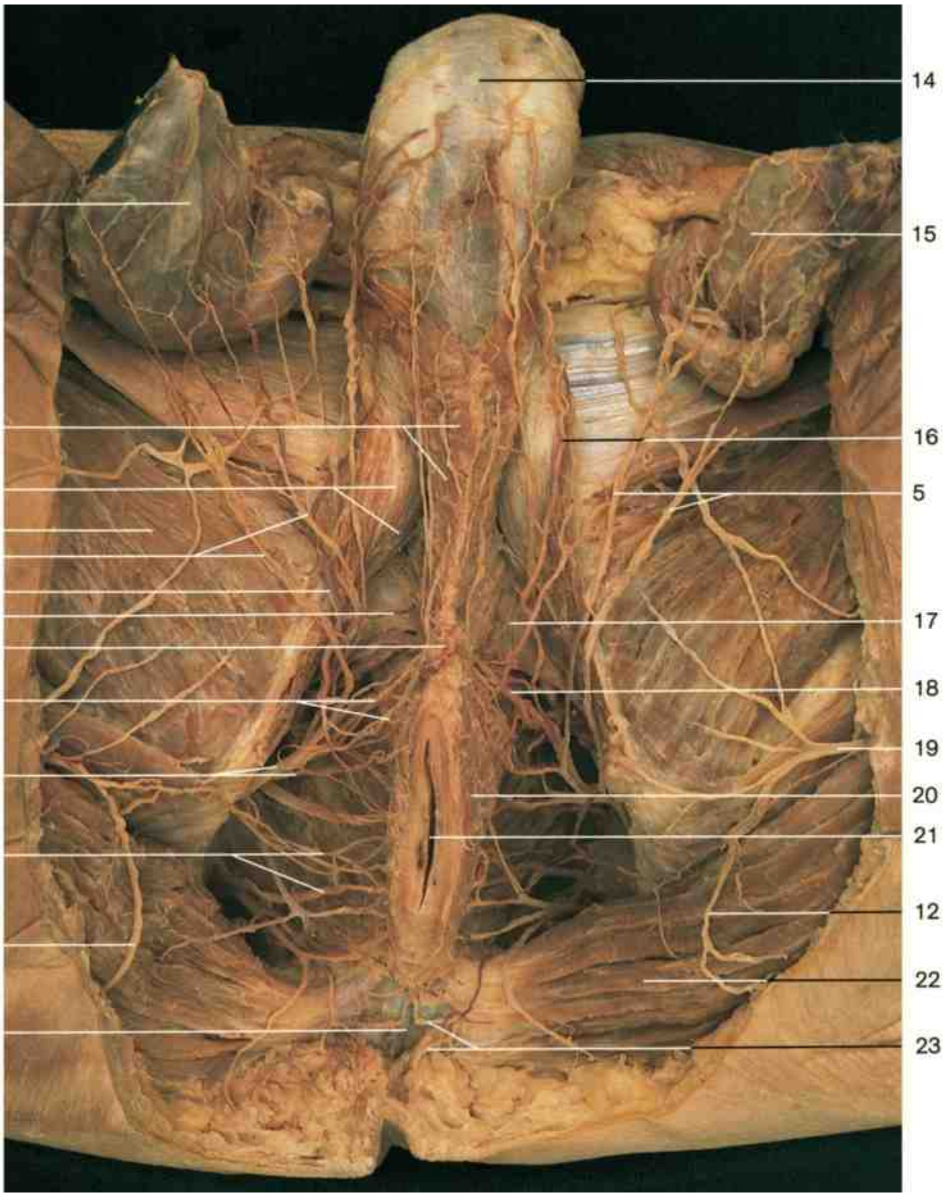


1 Glans penis
2 Corpus spongiosum of penis
3 Corpus cavernosum of penis
4 Gracilis muscle
5 Adductor muscles
6 Ischiocavernosus muscle overlying crus of penis
7 Perineal body
8 Gluteus maximus muscle
9 Coccyx
10 Bulbospongiosus muscle
11 Deep transverse perineus muscle covered by inferior fascia of urogenital diaphragm
12 Superficial transverse perineus muscle
13 Anus
14 External anal sphincter muscle
15 Levator ani muscle
16 Anococcygeal ligament
17 Obturator internus muscle
18 Urethra
19 Deep transverse perineus muscle

Muscles of urogenital and pelvic diaphragms in the male (from below).

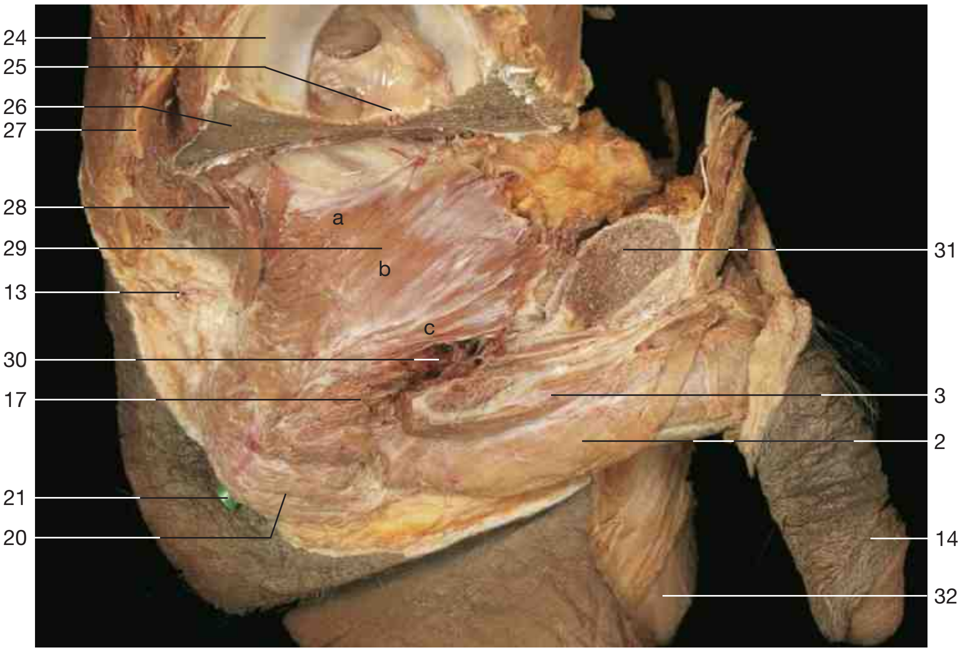


Muscles of urogenital and pelvic diaphragms in the male (from below). The penis has been divided (schematic drawing).

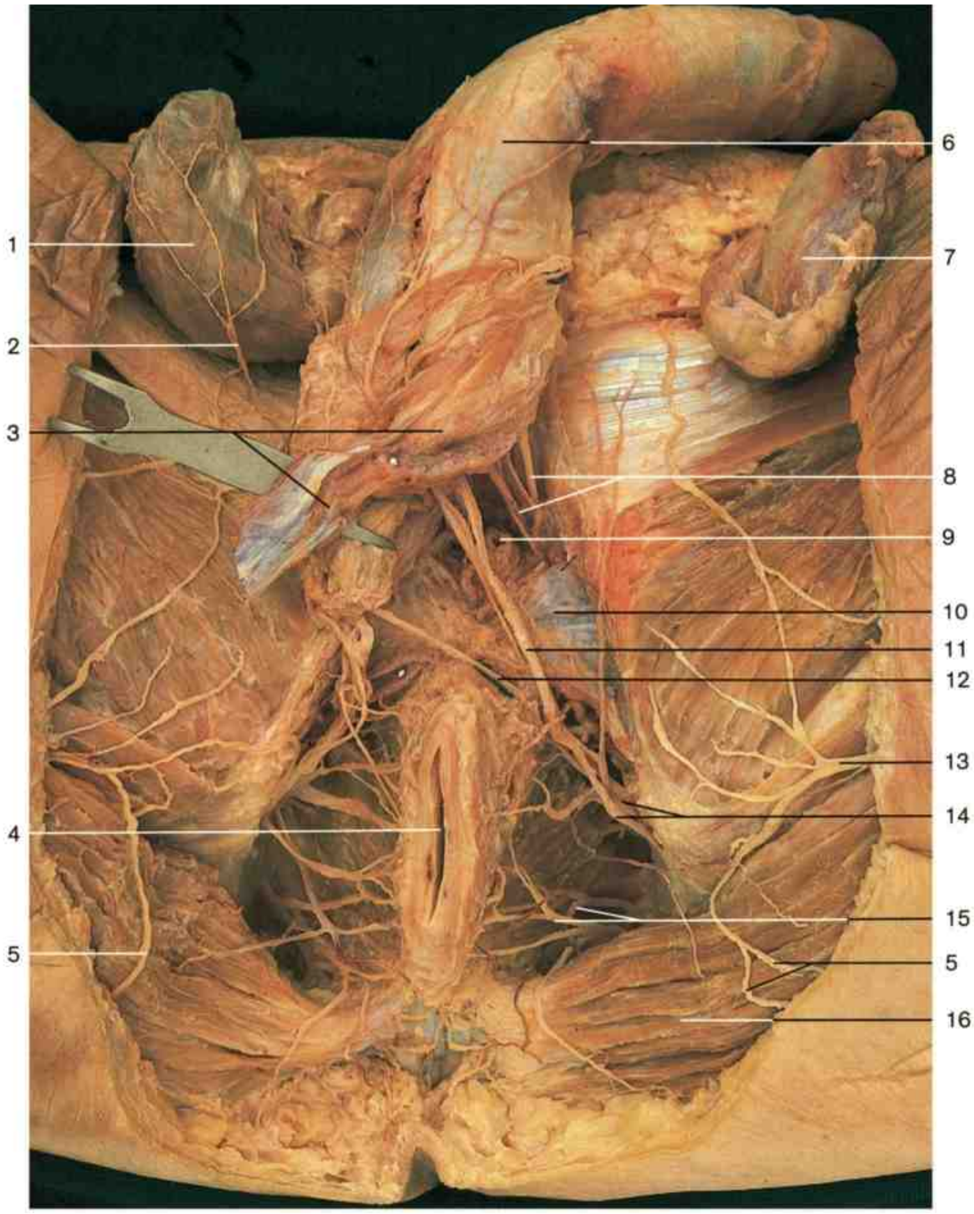


Urogenital diaphragm and external genital organs in the male with vessels and nerves (from below). The testes have been reflected laterally.

1 Right testis (reflected laterally and upward)
2 Bulbospongiosus muscle
3 Ischiocavernosus muscle
4 Adductor magnus muscle
5 Posterior scrotal nerves and superficial perineal arteries
6 Posterior scrotal artery and vein
7 Right artery of bulb of penis
8 Perineal body
9 Perineal branches of pudendal nerve
10 Pudendal nerve and internal pudendal artery
11 Inferior rectal arteries and nerves
12 Inferior cluneal nerve
13 Coccyx (location)
14 Penis
15 Left testis (reflected laterally)
16 Left posterior scrotal artery
17 Deep transverse perineal muscle
18 Left artery of bulb of penis
19 Posterior femoral cutaneous nerve
20 External anal sphincter muscle
21 Anus
22 Gluteus maximus muscle
23 Anococcygeal nerves
24 Acetabulum (femur removed)
25 Ligament of femoral head
26 Body of ischium (cut)
27 Sciatic nerve
28 Coccygeus muscle
29 Levator ani muscle
    a iliococcygeus muscle
    b pubococcygeus muscle
    c puborectalis muscle
30 Prostatic venous plexus
31 Body of pubis
32 Testis

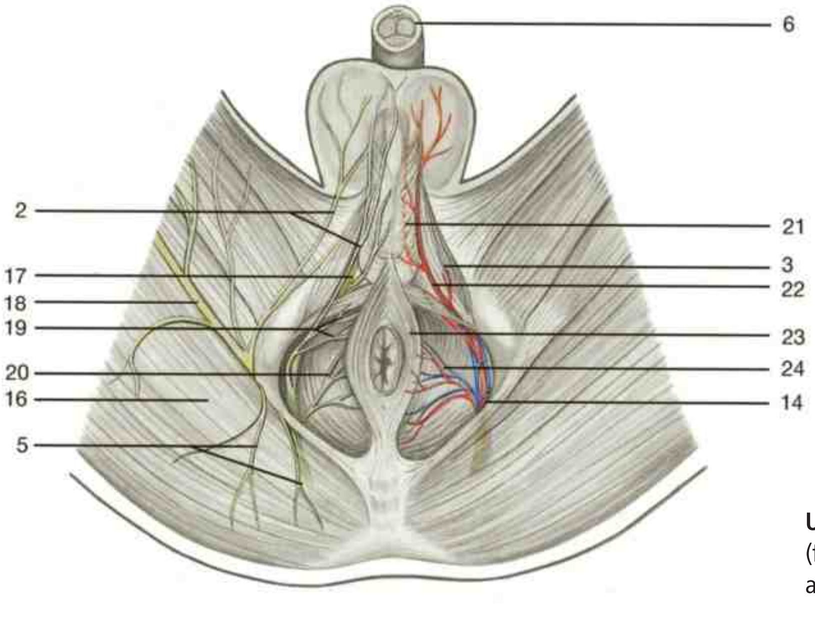


Pelvic diaphragm and external genital organs in the male. The right half of the pelvis including the obturator internus muscle and femur have been removed to display the right half of the levator ani muscle.



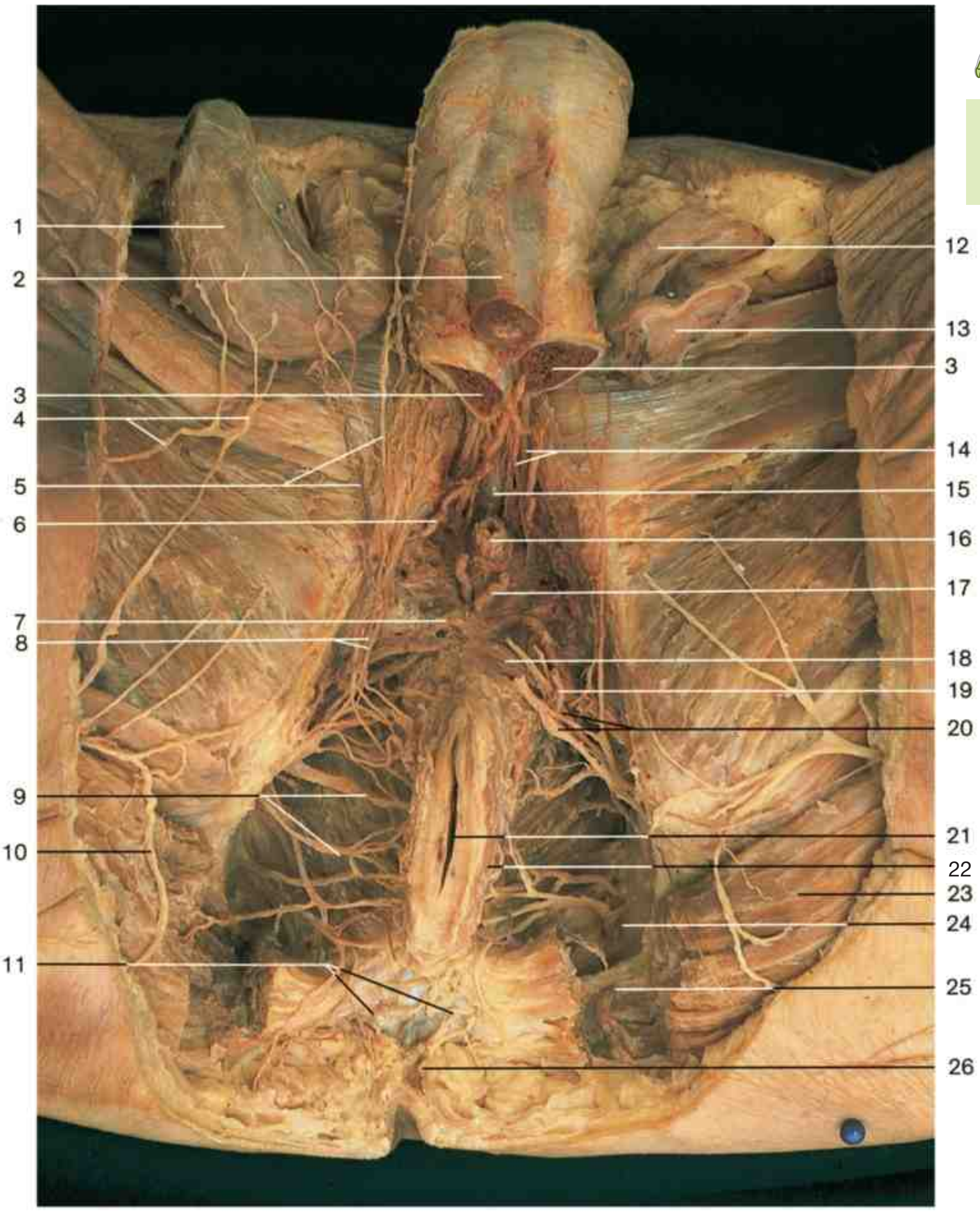
1 Right testis (reflected)
2 Posterior scrotal nerves
3 Left crus penis with ischiocavernosus muscle
4 Anus
5 Inferior cluneal nerves
6 Penis
7 Left testis (reflected)
8 Dorsal artery and nerve of penis
9 Urethra
10 Deep transverse perineus muscle
11 Perineal branch of pudendal nerve
12 Artery of bulb of penis (reflected)
13 Branch of posterior femoral cutaneous nerve
14 Internal pudendal artery and pudendal nerve
15 Inferior rectal arteries and nerves
16 Gluteus maximus muscle
17 Dorsal nerve of penis
18 Posterior femoral cutaneous nerve
19 Perineal branches of pudendal nerve
20 Inferior rectal nerves
21 Bulbospongiosus muscle (inside: dorsal artery of penis)
22 Perineal artery
23 External anal sphincter muscle
24 Inferior rectal artery and veins

Urogenital diaphragm and external genital organs in the male (from below). The left crus penis has been isolated and reflected laterally together with the bulb of the penis. The urethra has been cut.

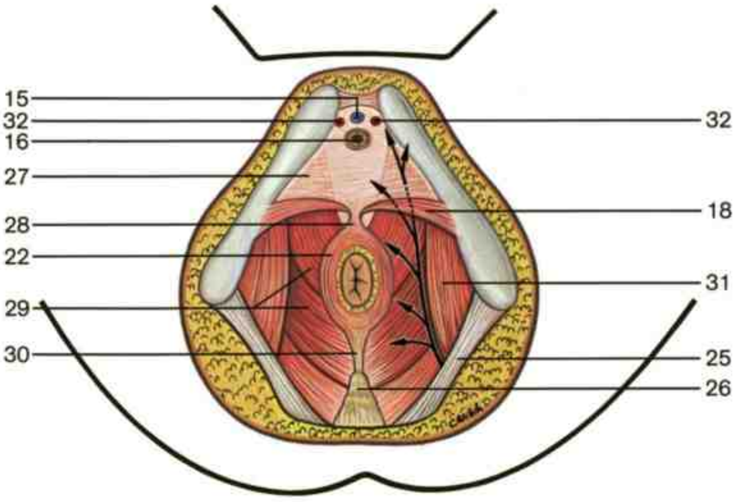


Urogenital and anal region in the male (from below). Right side: nerves; left side: arteries and veins.

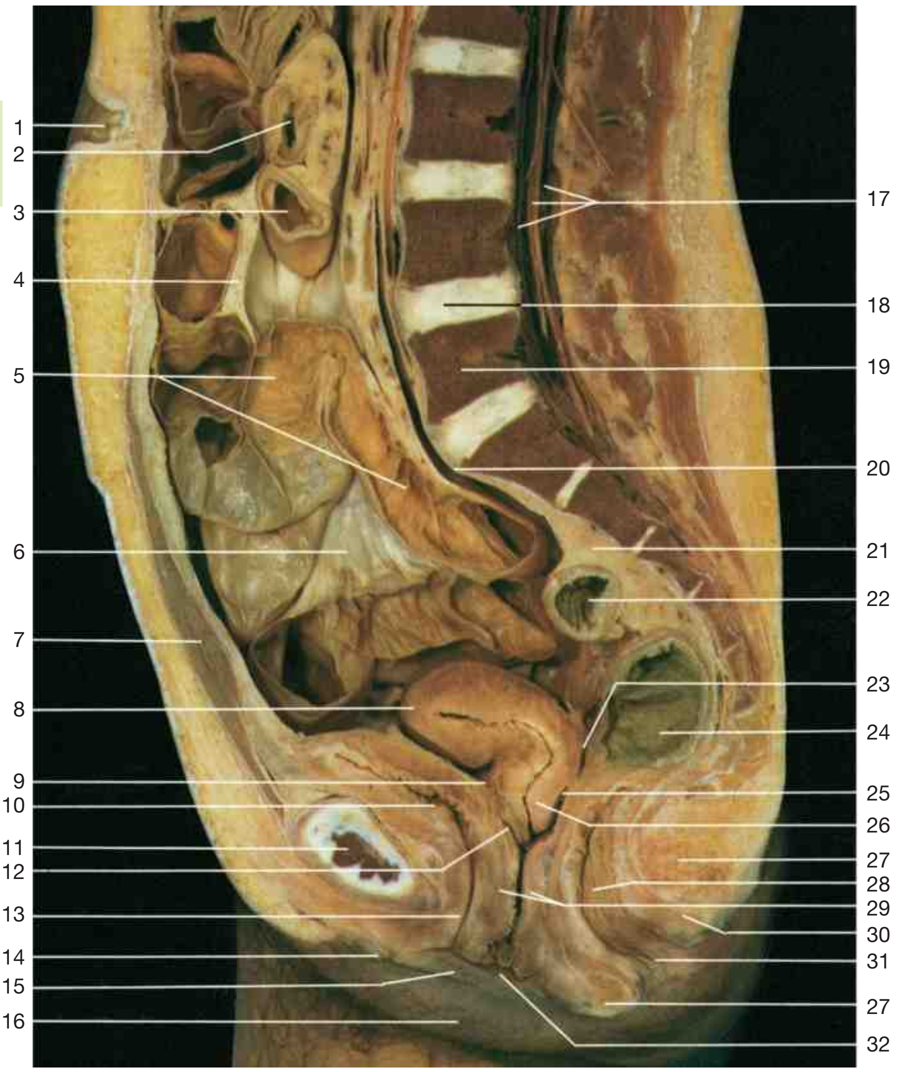
1 Right testis (reflected)
2 Corpus spongiosum of penis
3 Corpus cavernosum of penis
4 Perineal branch of posterior femoral cutaneous nerve
5 Posterior scrotal arteries and nerves
6 Deep artery of penis
7 Deep transverse perineal muscle
8 Right perineal nerves
9 Inferior rectal nerves
10 Inferior cluneal nerve
11 Anococcygeal nerves
12 Left spermatic cord
13 Left testis (cut surface)
14 Dorsal artery and nerve of penis
15 Deep dorsal vein of penis
16 Urethra (cut)
17 Artery of bulb of penis
18 Superficial transverse perineus muscle
19 Left artery of bulb of penis
20 Perineal branch of pudendal nerve
21 Anus
22 External anal sphincter muscle
23 Gluteus maximus muscle
24 Internal pudendal artery and pudendal nerve
25 Sacrotuberous ligament
26 Coccyx
27 Urogenital diaphragm (deep transverse perineus muscle)
28 Tendinous center of perineum (perineal body)
29 Levator ani muscle
30 Anococcygeal ligament
31 Obturator internus muscle
32 Dorsal artery of penis



Urogenital diaphragm and external genital organs in the male (from below). The root of the penis has been cut. Dissection of the urogenital diaphragm.

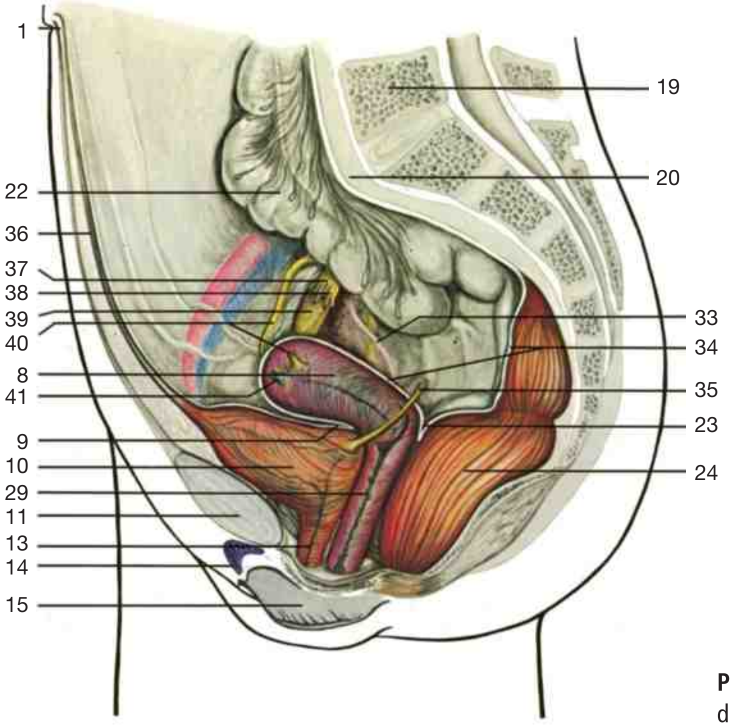


Urogenital and pelvic diaphragms in the male (from below). The penis has been removed. The arrows indicate the course of vessels and nerves (schematic drawing).



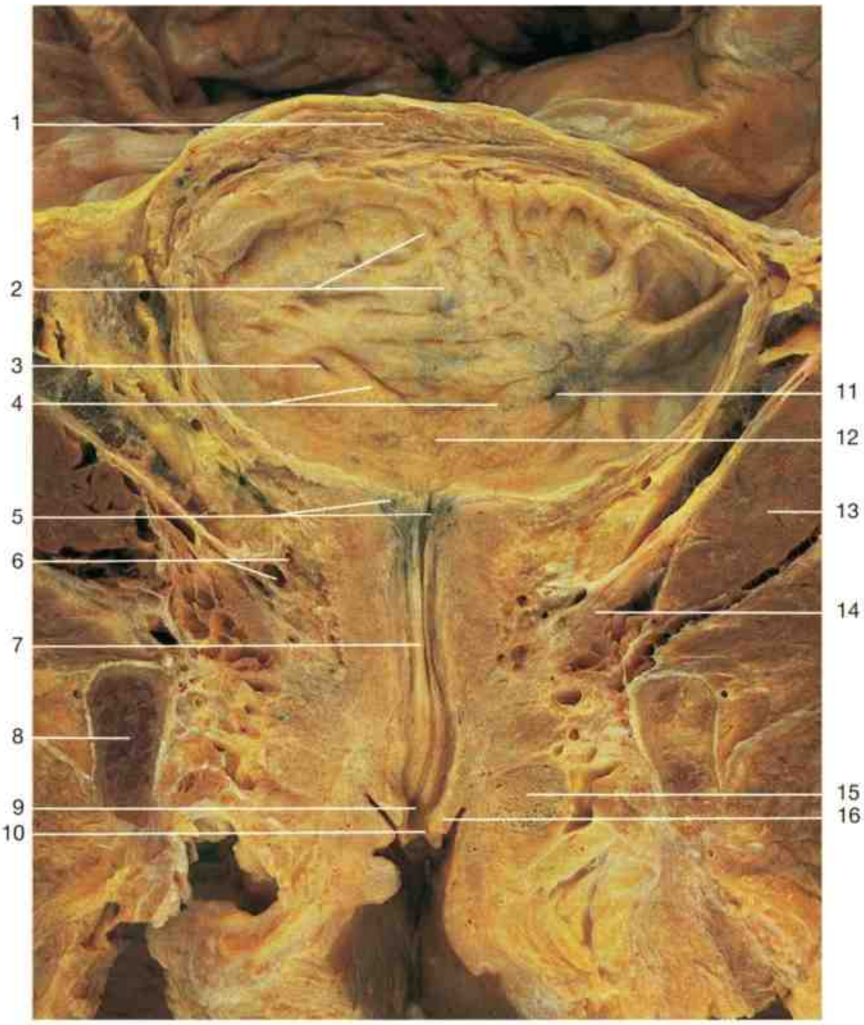
Female urogenital system, midsagittal section through the trunk. The urinary bladder is empty, position and shape of the uterus are normal.

1	Umbilicus
2	Duodenum
3	Ascending part of duodenum
4	Root of mesentery
5	Small intestine
6	Mesentery
7	Rectus abdominis muscle
8	Uterus
9	Vesico-uterine pouch
10	Urinary bladder (collapsed)
11	Pubic symphysis
12	Anterior fornix of vagina
13	Urethra
14	Clitoris
15	Labium minus
16	Labium majus
17	Vertebral canal with cauda equina
18	Intervertebral disc
19	Body of fifth lumbar vertebra
20	Sacral promontory
21	Mesosigmoid
22	Sigmoid colon
23	Recto-uterine pouch (of Douglas)
24	Ampulla of rectum
25	Posterior fornix of vagina
26	Cervix of uterus
27	External anal sphincter muscle
28	Anal canal
29	Vagina
30	Internal anal sphincter muscle
31	Anus
32	Hymen
33	Left ureter
34	Peritoneum (cut edge)
35	Right ureter (divided)
36	Median umbilical fold with urachus
37	Infundibulum of uterine tube
38	Fimbriae of uterine tube
39	Ovary
40	Uterine tube (isthmus)
41	Round ligament of uterus

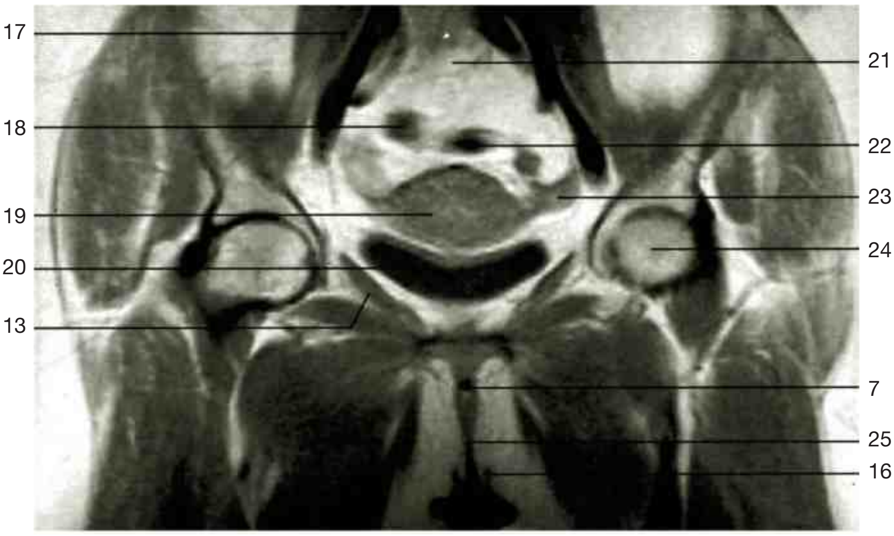


Positions of female genital organs (medial aspect, schematic drawing).

1 Muscular coat of urinary bladder
2 Folds of mucous membrane of urinary bladder
3 Right ureteric orifice
4 Interureteric fold
5 Internal urethral orifice
6 Vesico-uterine venous plexus
7 Urethra
8 Pubic bone (cut edge)
9 External urethral orifice
10 Vestibule of vagina
11 Left ureteric orifice
12 Trigone of bladder
13 Obturator internus muscle
14 Levator ani muscle
15 Bulb of the vestibule
16 Left labium minus
17 Psoas major muscle
18 Ampulla of rectum
19 Uterus
20 Urinary bladder
21 Promontory
22 Sigmoid colon
23 Uterine tube
24 Head of femur
25 Vagina

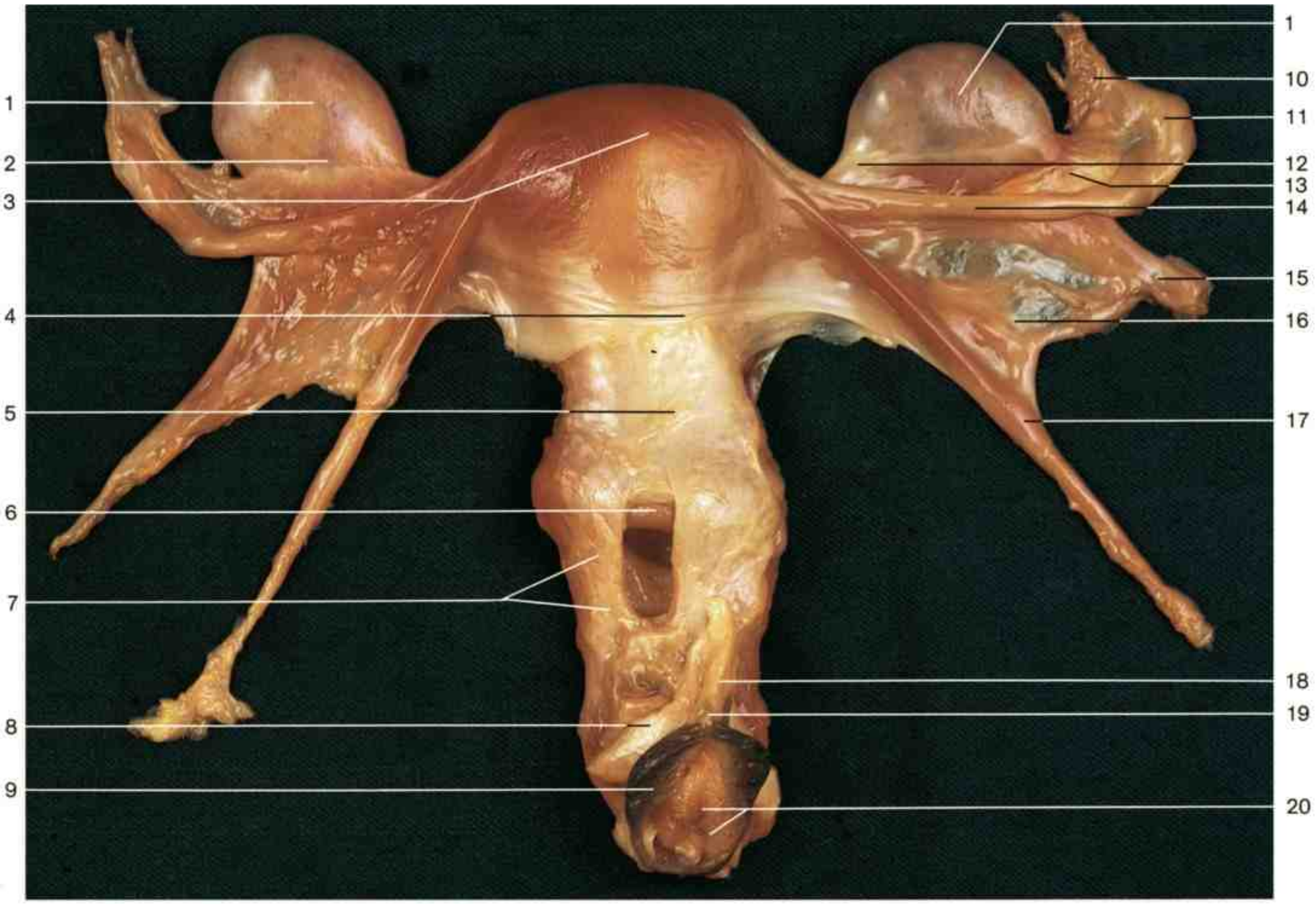


Coronal section through the female urinary bladder and urethra (anterior aspect).

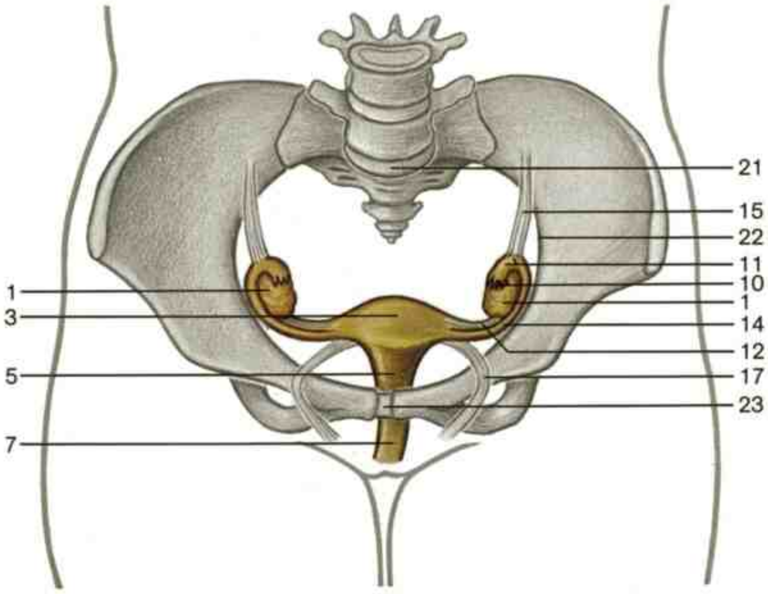


Coronal section through the pelvic cavity of the female (MRI scan).

The urogenital system of the female differs greatly from that of the male. During embryonal development, the uterus and ovary remain within the pelvic cavity where, after puberty, the ovulation takes place. Therefore, the urinary system remains functionally separated from the genital organs in the female.

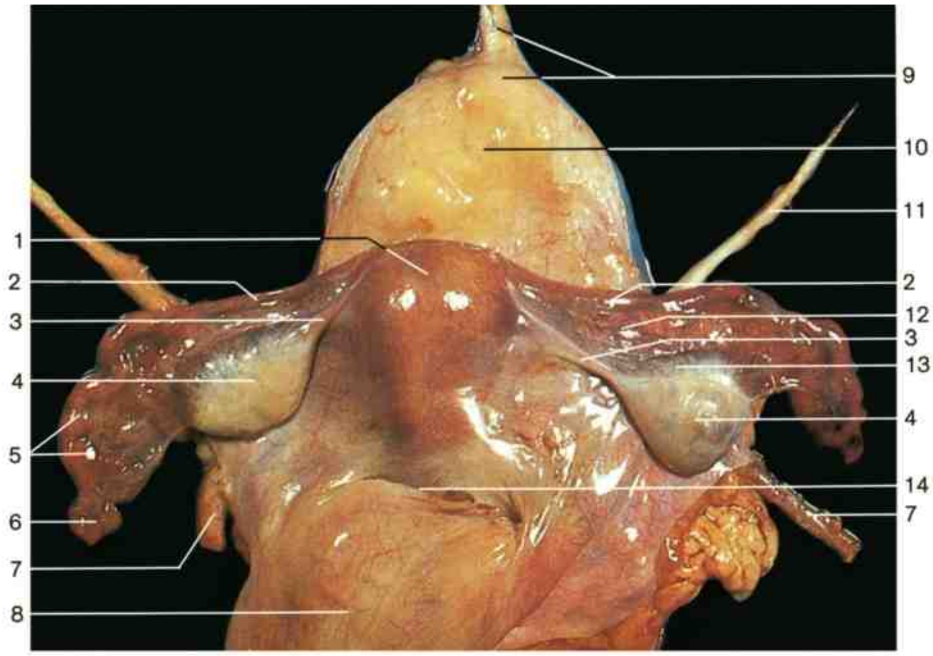


Female genital organs, isolated (anterior aspect). The anterior wall of the vagina has been opened to display the vaginal portion of the cervix.

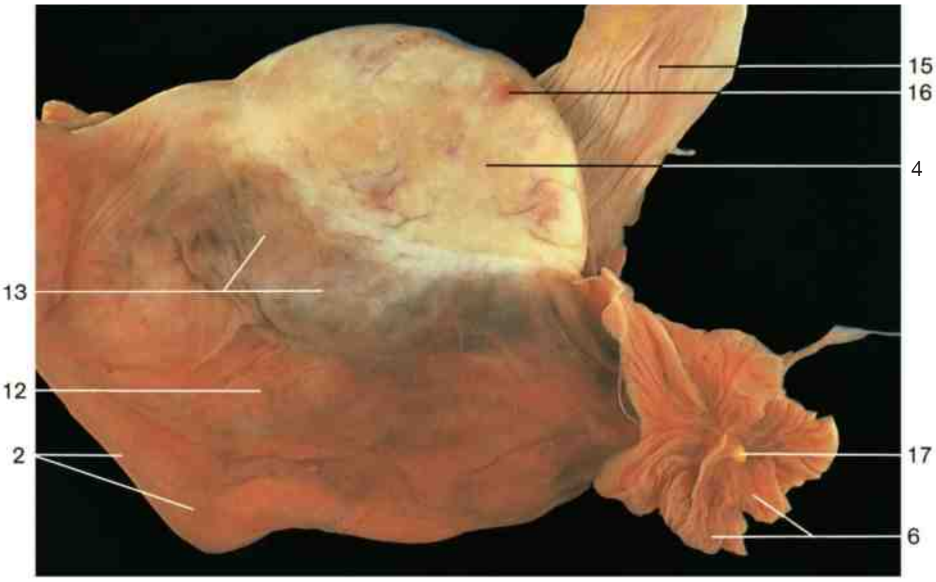


Female internal genital organs (schematic drawing).

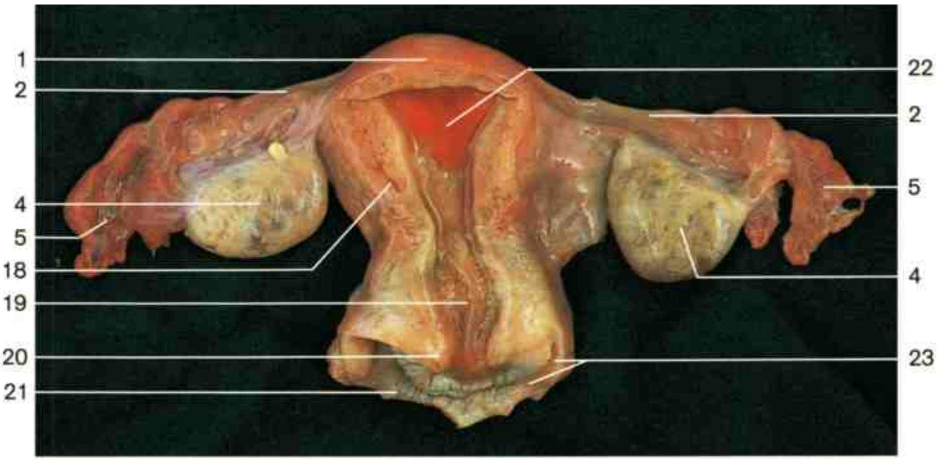
1	Ovary
2	Mesovarium
3	Fundus of uterus
4	Vesico-uterine pouch
5	Cervix of uterus
6	Vaginal portion of cervix
7	Vagina
8	Crus of clitoris
9	Labium minus
10	Fimbriae of uterine tube
11	Infundibulum of uterine tube
12	Ligament of the ovary
13	Mesosalpinx
14	Uterine tube
15	Suspensory ligament of ovary (caudally displaced)
16	Broad ligament of uterus
17	Round ligament of uterus
18	Corpus cavernosum of clitoris
19	Glans of clitoris
20	Hymen, vaginal orifice
21	Promontory
22	Linea terminalis of pelvis
23	Pubic symphysis



Female genital organs, isolated (supero-posterior aspect).

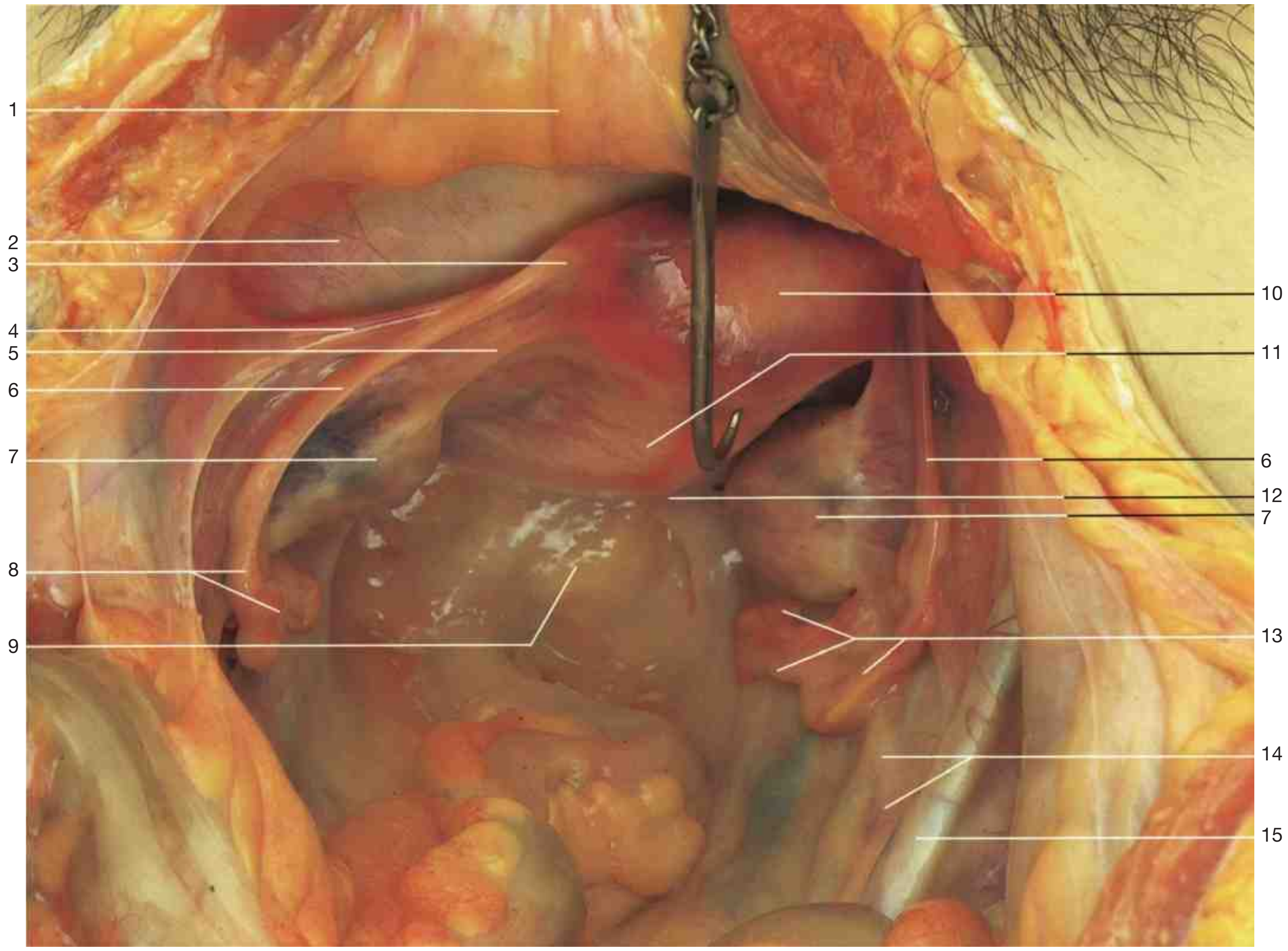


Right ovary and uterine tube, isolated (supero-posterior aspect). The fimbriae of the uterine tube have been reflected to show the abdominal ostium.

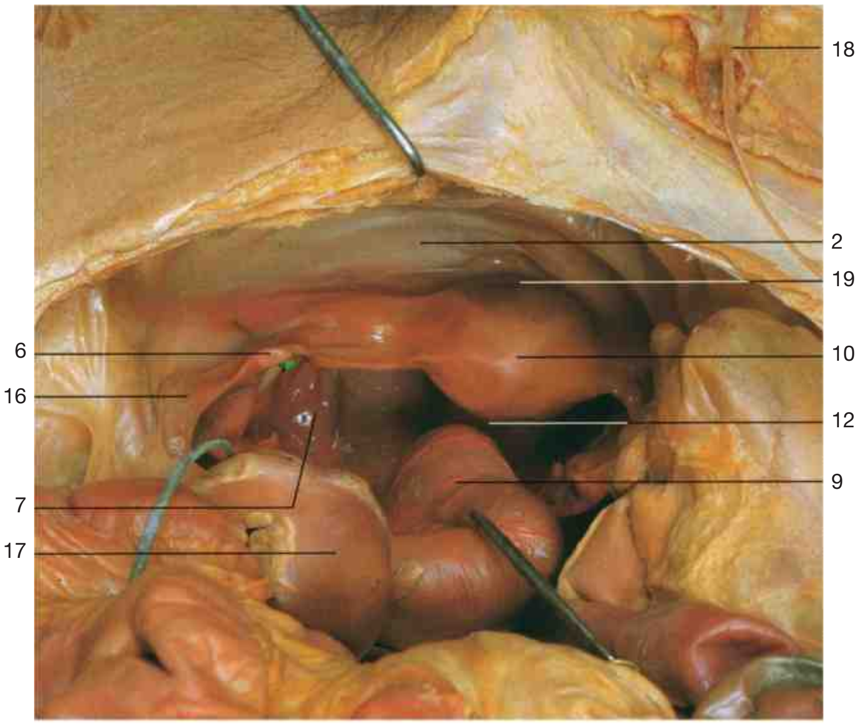


Uterus and related organs (posterior aspect). The posterior wall of the uterus has been opened.

1	Fundus of uterus
2	Uterine tube
3	Ligament of the ovary
4	Ovary
5	Infundibulum of uterine tube
6	Fimbriae of uterine tube
7	Ureter
8	Rectum
9	Apex of urinary bladder and median umbilical ligament
10	Urinary bladder
11	Round ligament of uterus
12	Mesosalpinx
13	Mesovarium
14	Recto-uterine pouch (of Douglas)
15	Suspensory ligament of ovary
16	Scarring of ovary (following ovulation)
17	Abdominal opening of uterine tube
18	Body of uterus
19	Cervical canal
20	Vaginal portion of cervix of uterus (congestion)
21	Vagina
22	Mucous membrane of uterus
23	Anterior fornix of vagina

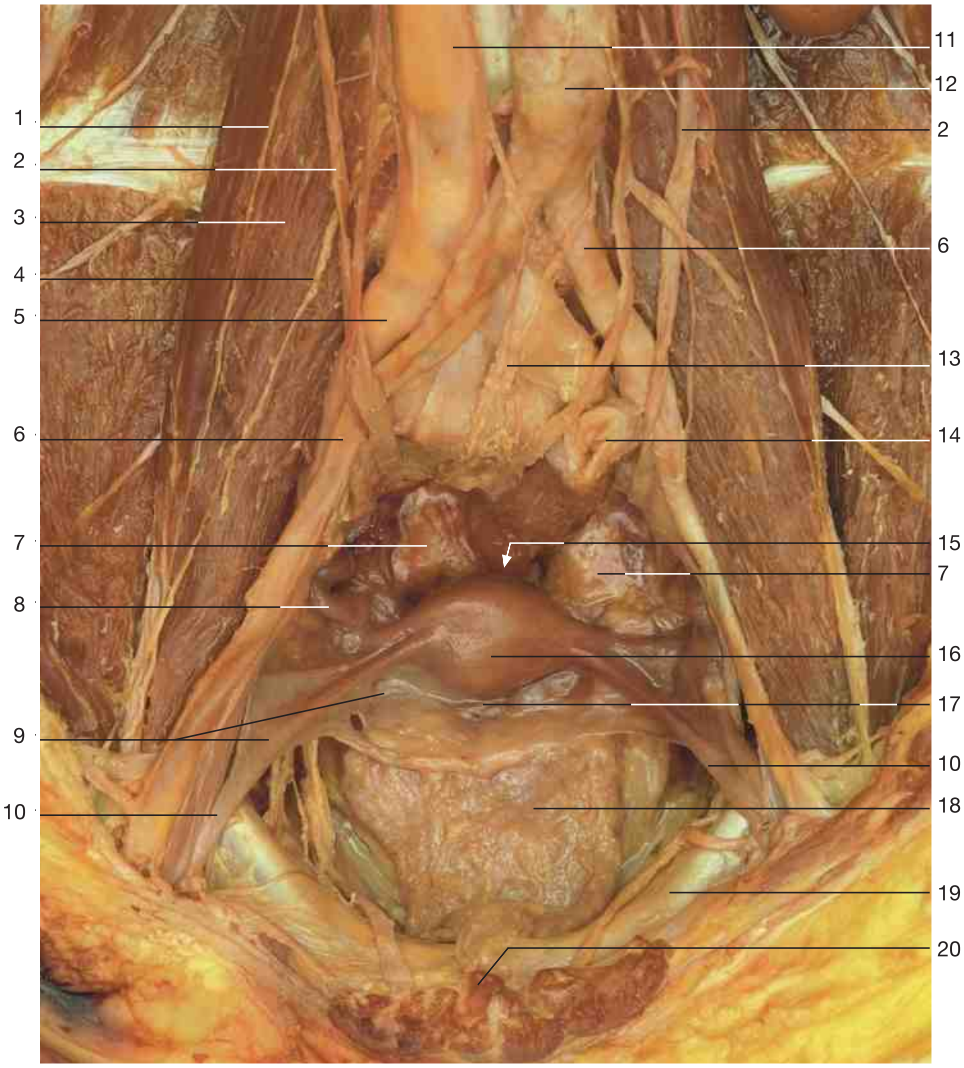


Female internal genital organs. Pelvic cavity (seen from above). The uterus has been reflected to the right.



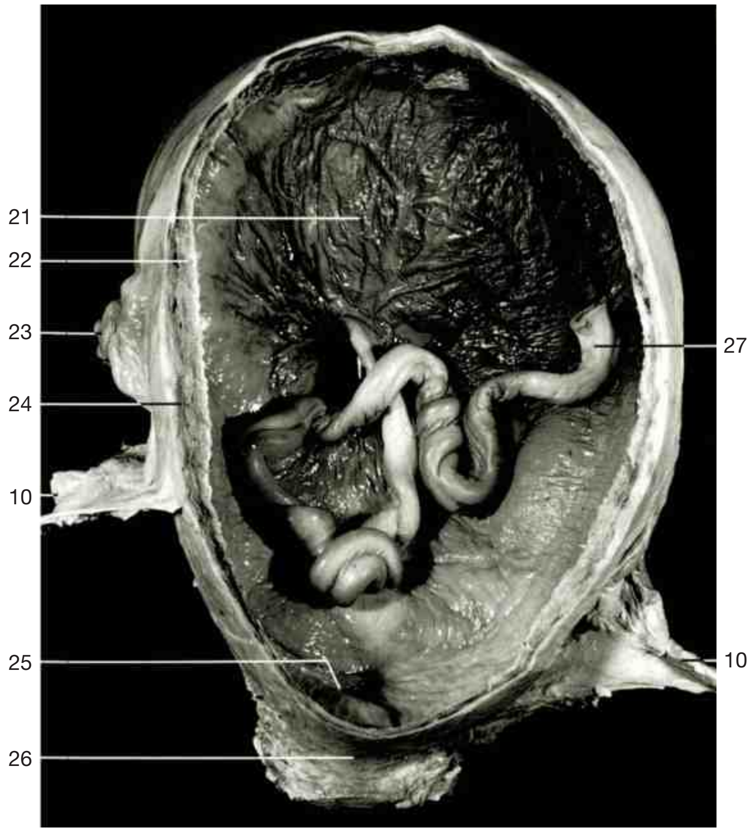
Female internal genital organs. Pelvic cavity (seen from above).

1 Median umbilical fold with urachus
2 Urinary bladder
3 Insertion of uterine tube at fundus of uterus
4 Round ligament of uterus
5 Ligament of ovary
6 Uterine tube (isthmus)
7 Ovary
8 Ampulla of uterine tube
9 Rectum
10 Uterus
11 Vagina
12 Recto-uterine pouch (of Douglas)
13 Fimbriae of uterine tube
14 Suspensory ligament of ovary
15 Right common iliac artery (covered by peritoneum)
16 Mesosalpinx
17 Sigmoid colon
18 Saphenous opening
19 Vesico-uterine pouch



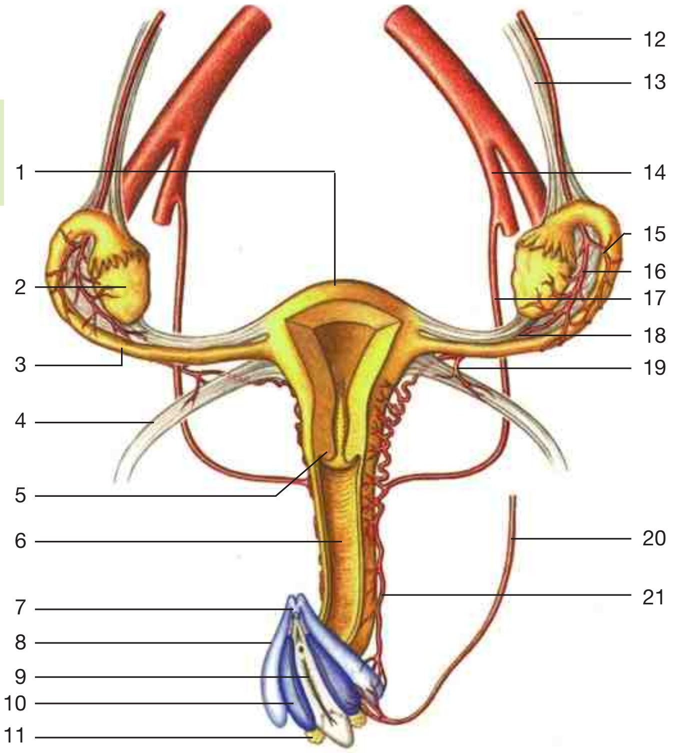
1	Ilio-inguinal nerve
2	Ureter
3	Psoas major muscle
4	Genitofemoral nerve
5	Common iliac vein
6	Common iliac artery
7	Ovary
8	Uterine tube
9	Peritoneum
10	Round ligament of uterus
11	Inferior vena cava
12	Abdominal aorta
13	Superior hypogastric plexus
14	Rectum
15	Recto-uterine pouch (of Douglas)
16	Uterus
17	Vesico-uterine pouch
18	Urinary bladder
19	Iliac crest
20	Pubic symphysis
21	Placenta
22	Amnion and chorion
23	Adnexa of uterus (uterine tube and ovaries)
24	Myometrium
25	Internal orifice of uterus
26	Cervix of uterus
27	Umbilical cord

View of the female pelvis showing uterus and related organs (superior aspect).

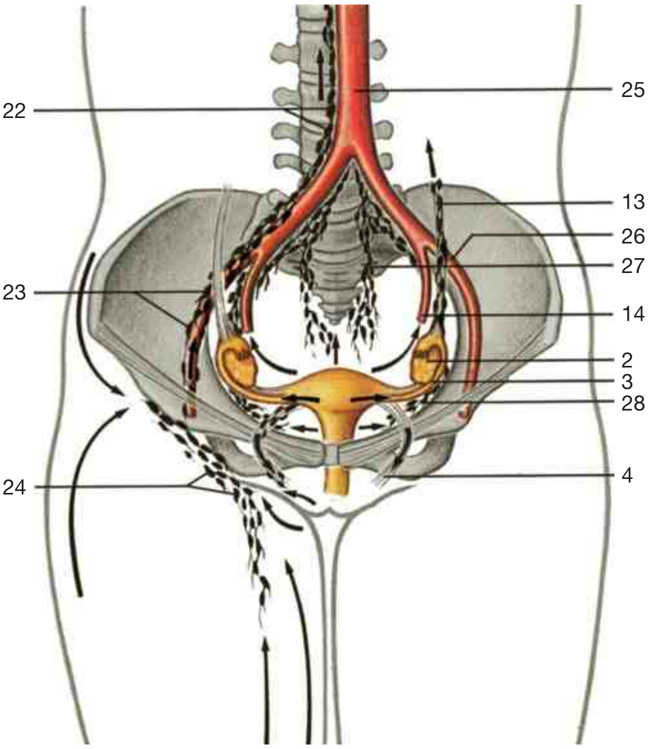


Fullterm uterus with placenta (anterior aspect). The anterior wall of the uterus has been removed to show the location of the placenta.

Female Internal Genital Organs: Arteries and Lymph Vessels

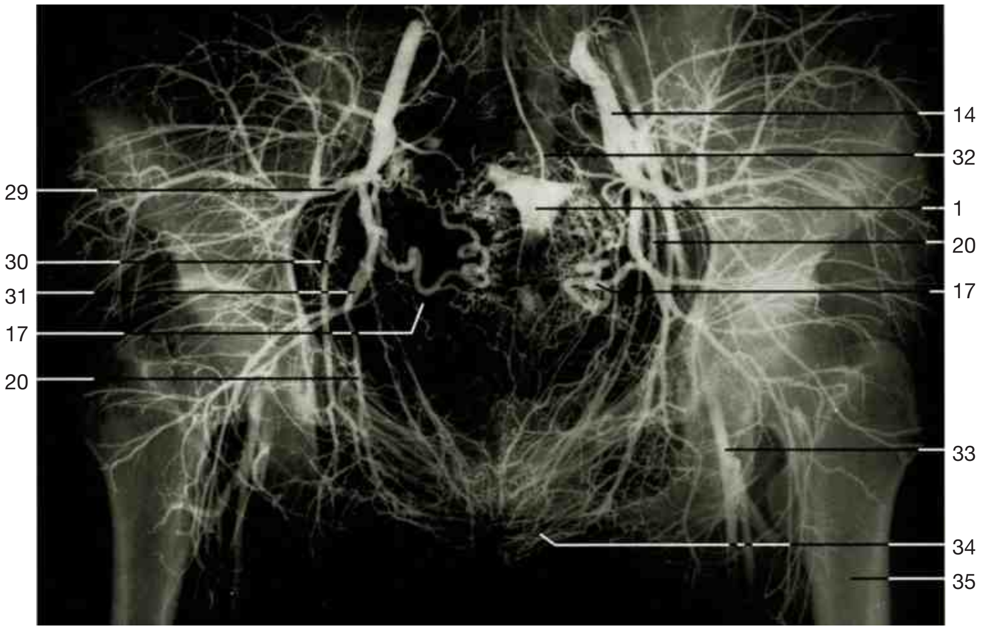


Arteries of female genital organs (schematic drawing).

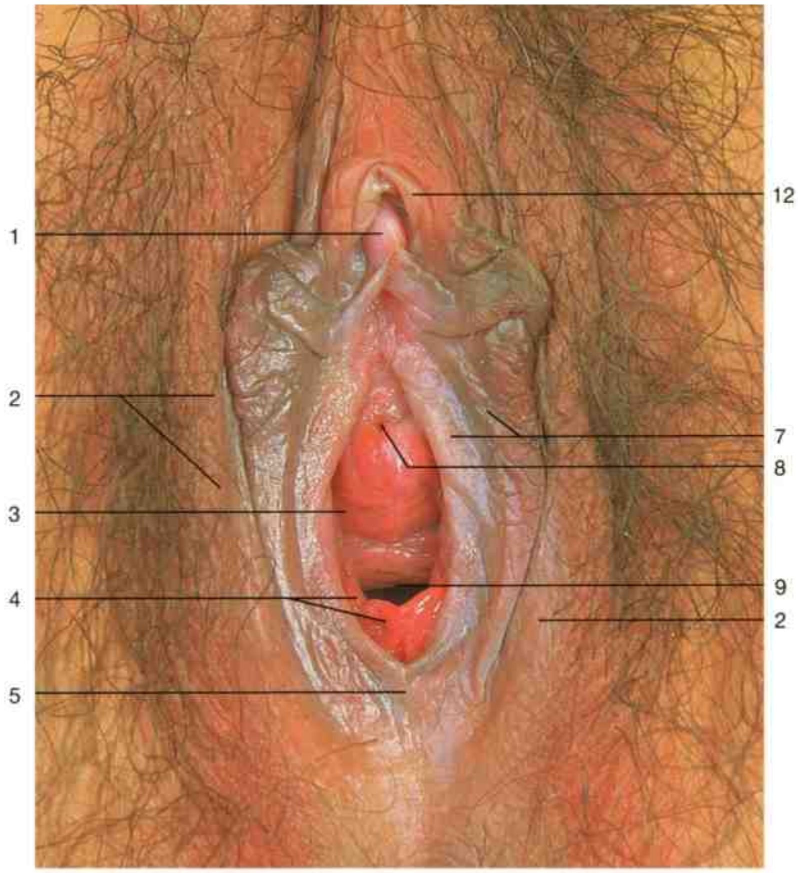


Main drainage routes of lymph vessels of uterus and its adnexa (indicated by arrows). (Schematic drawing.) Red = arteries; black = lymph vessels and nodes.

1 Uterus
2 Ovary
3 Uterine tube
4 Round ligament of uterus
5 Vaginal portion of cervix of uterus
6 Vagina
7 Clitoris
8 Corpus cavernosum of clitoris
9 Vaginal orifice
10 Bulb of vestibule
11 Greater vestibular gland
12 Ovarian artery
13 Suspensory ligament of ovary
14 Internal iliac artery
15 Tubal branch of ovarian artery
16 Ovarian branch of ovarian artery
17 Uterine artery
18 Ovarian branch of uterine artery
19 Artery of round ligament
20 Internal pudendal artery
21 Vaginal artery
22 Lumbar lymph nodes
23 External iliac lymph nodes
24 Inguinal lymph nodes
25 Abdominal aorta
26 External iliac artery
27 Sacral lymph nodes
28 Internal iliac lymph nodes
29 Superior gluteal artery
30 Obturator artery
31 Inferior gluteal artery
32 Middle sacral artery
33 Femoral artery
34 Vessels of labium majus
35 Femur

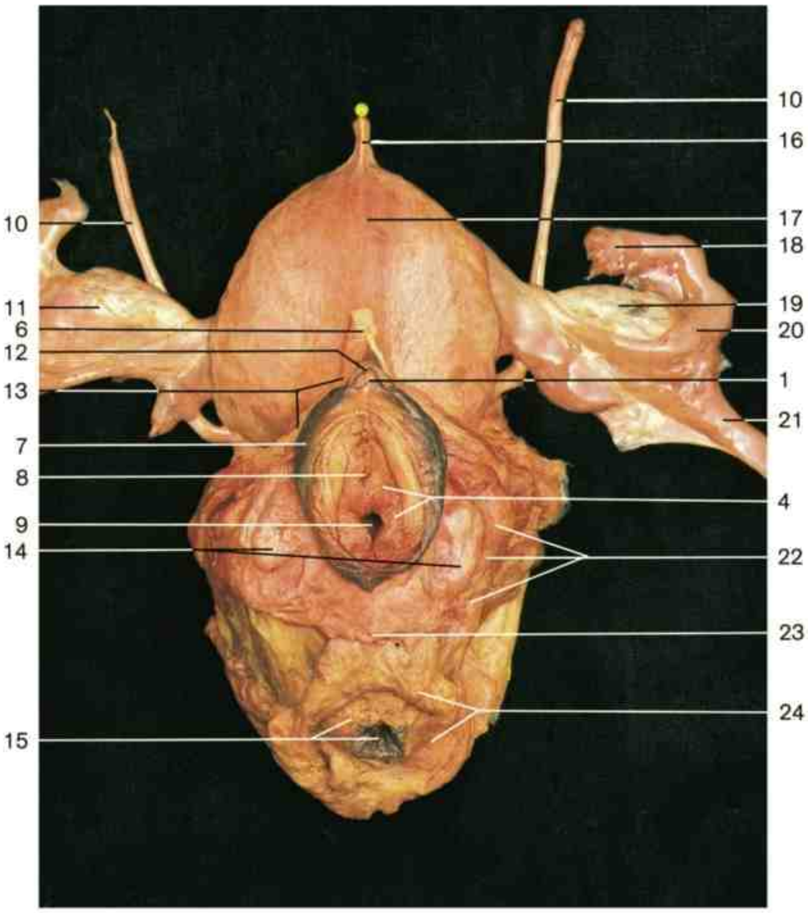


Pelvic vessels in the female (arteriography, antero-posterior view).

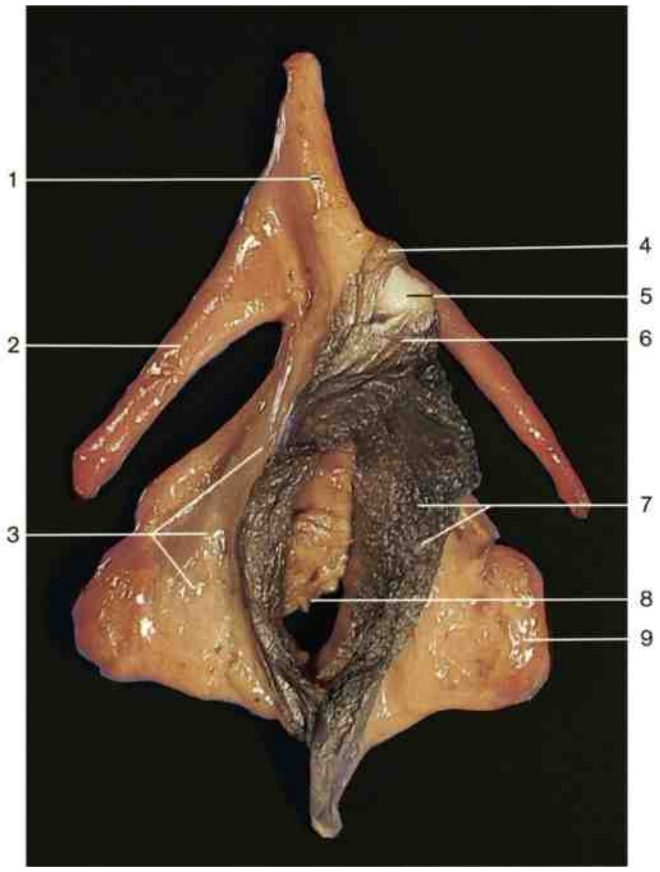


Female external genital organs (anterior aspect). Labia reflected.

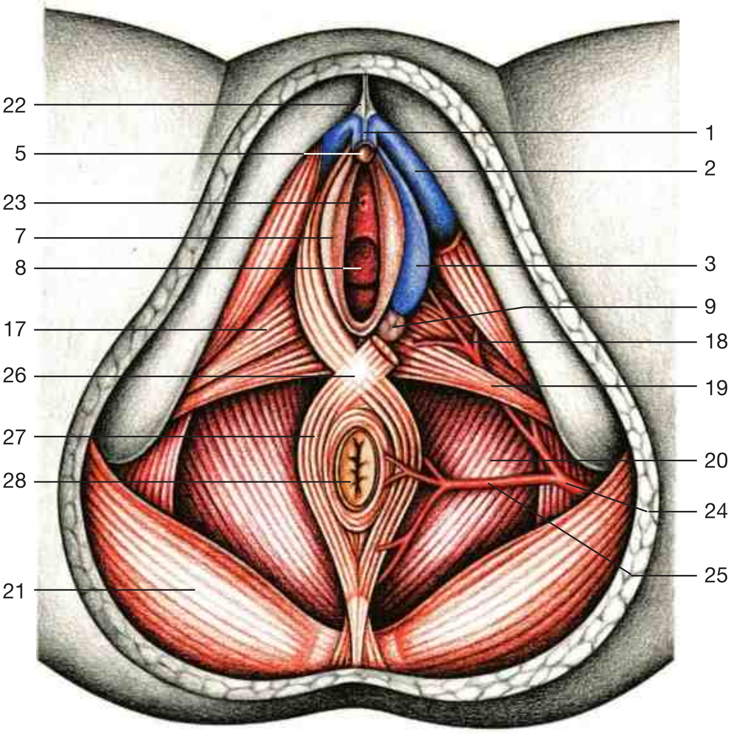
1	Glans of clitoris
2	Labium majus
3	Vestibule of vagina
4	Hymen
5	Posterior labial commissure
6	Body of clitoris
7	Labium minus
8	External orifice of urethra
9	Vaginal orifice
10	Ureter
11	Adnexa of uterus
12	Prepuce of clitoris
13	Crus of clitoris
14	Greater vestibular glands
15	Anus and internal anal sphincter muscle
16	Median umbilical ligament containing urachus
17	Urinary bladder
18	Infundibulum of uterine tube
19	Ovary
20	Ampulla of uterine tube
21	Suspensory ligament of the ovary
22	Bulbospongiosus muscle and bulb of vestibule
23	Central tendon of perineum (perineal body)
24	External anal sphincter muscle



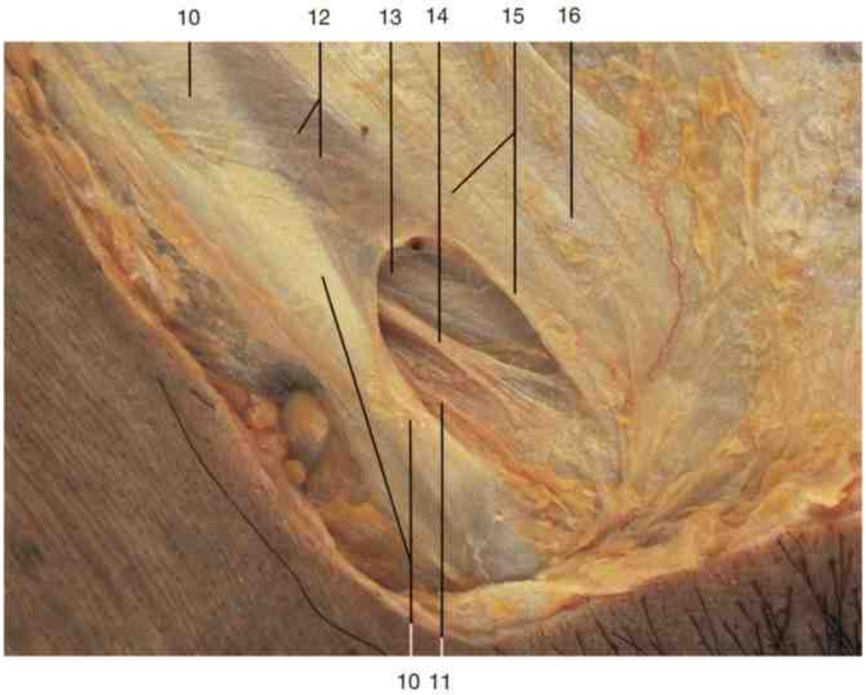
Female external genital organs in relation to internal genital organs and urinary system, isolated (anterior aspect).



Cavernous tissue of female external genital organs, isolated (anterior aspect).

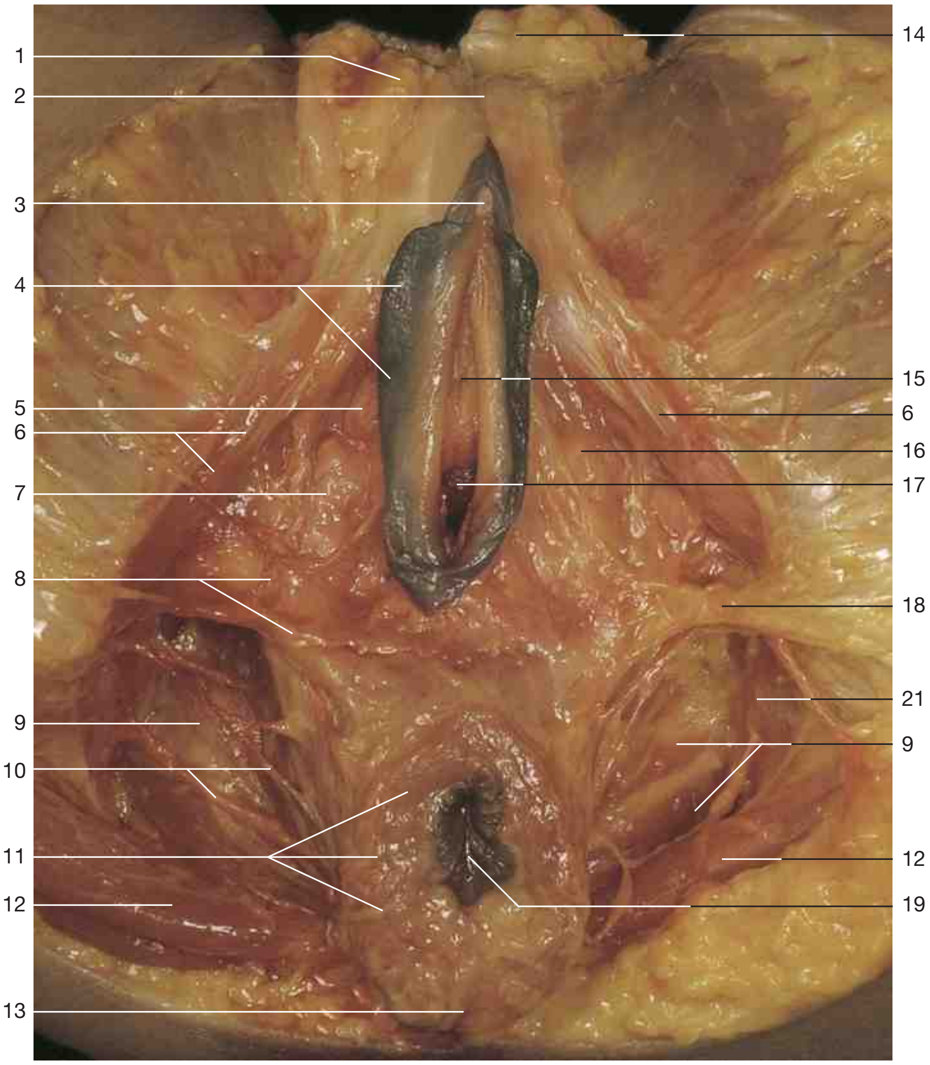


Urogenital and pelvic diaphragms (anterior aspect, schematic drawing). Blue = cavernous tissue of clitoris and bulb of vestibule.

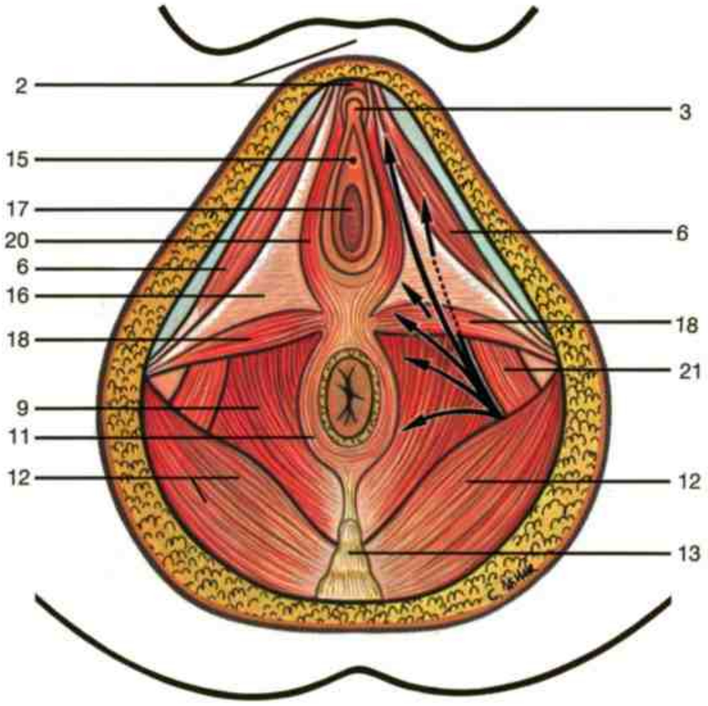


Inguinal canal and round ligament of uterus in situ (right side, ventral aspect).

1 Body of clitoris
2 Crus of clitoris
3 Bulb of vestibule
4 Prepuce of clitoris
5 Glans of clitoris
6 Frenulum of clitoris
7 Labium minus
8 Vaginal orifice
9 Greater vestibular gland
10 Lateral crus of superficial inguinal ring
11 Ilio-inguinal nerve
12 Intercrural fibers
13 Superficial inguinal ring
14 Round ligament of uterus
15 Medial crus of superficial inguinal ring
16 Aponeurosis of external abdominal oblique muscle
17 Deep transverse perineal muscle with fascia
18 Deep artery of clitoris
19 Superficial transverse perineus muscle
20 Levator ani muscle
21 Gluteus maximus muscle
22 Suspensory ligament of clitoris
23 External orifice of urethra
24 Internal pudendal artery
25 Inferior rectal artery
26 Perineal body
27 External anal sphincter muscle
28 Anus

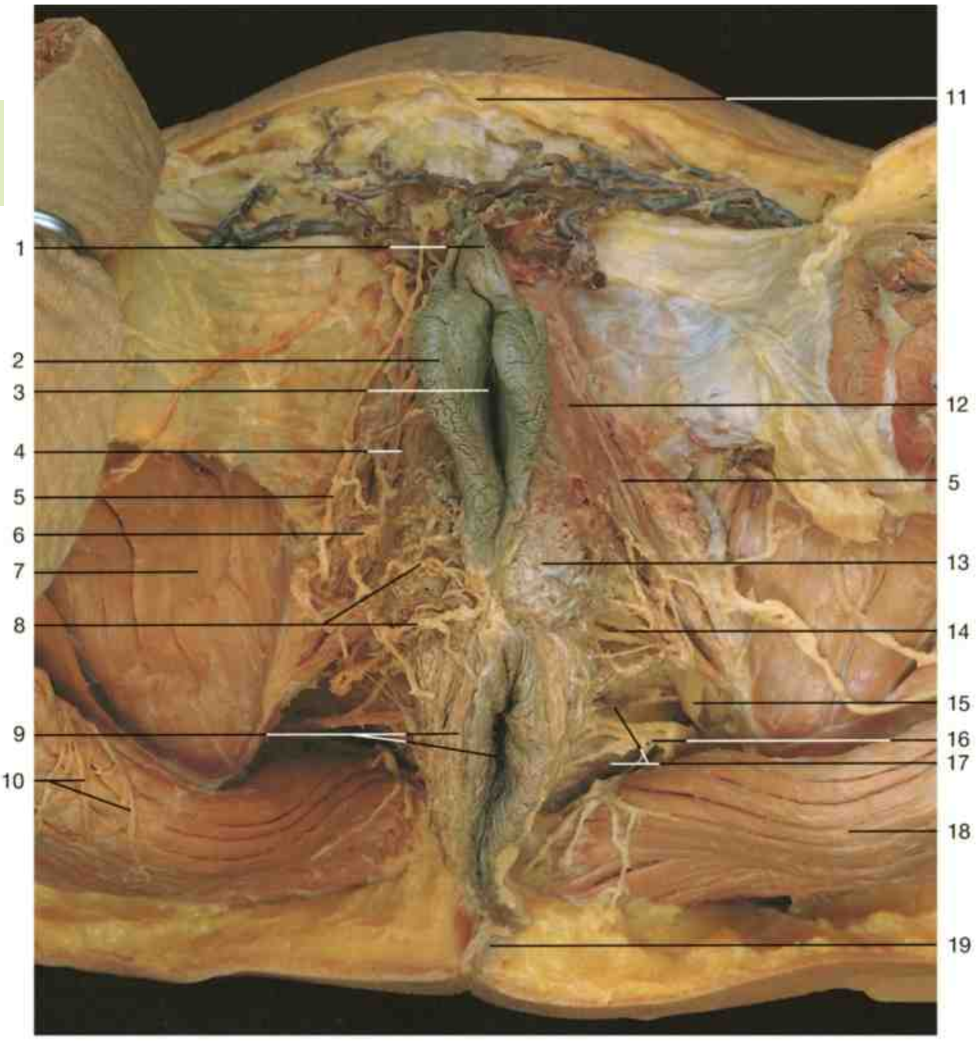


Urogenital diaphragm and external genital organs in the female, superficial layer (from below).

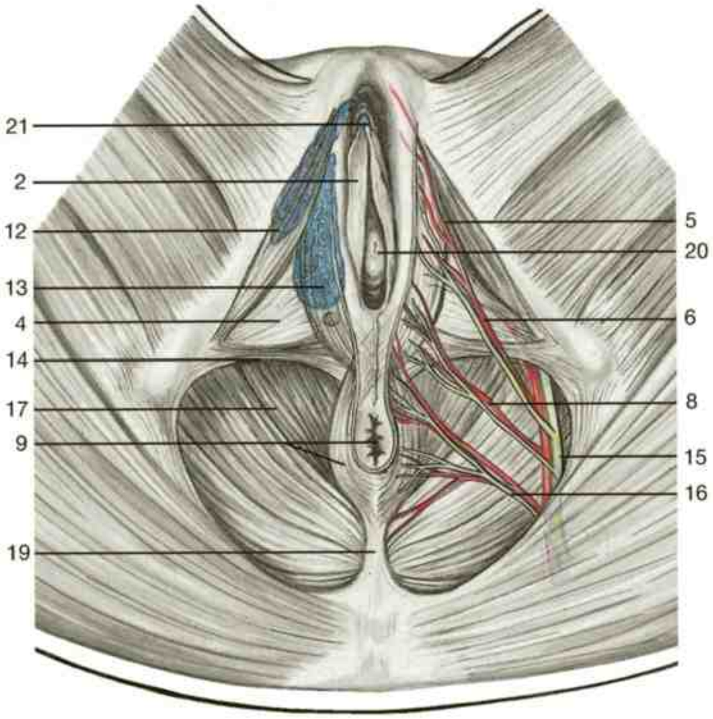


Muscles of pelvic and urogenital diaphragms in the female (from below, schematic drawing).

1	Fatty tissue encasing round ligament
2	Position of pubic symphysis
3	Clitoris
4	Labium minus
5	Bulb of vestibule
6	Ischiocavernosus muscle
7	Greater vestibular gland
8	Perineal branches of pudendal nerve
9	Levator ani muscle
10	Inferior rectal nerves
11	External anal sphincter muscle
12	Gluteus maximus muscle
13	Coccyx
14	Fatty tissue of mons pubis
15	External orifice of urethra
16	Urogenital diaphragm with fascia of deep transverse perineus muscle
17	Vaginal orifice
18	Superficial transverse perineal muscle
19	Anus
20	Bulbospongiosus muscle
21	Obturator internus muscle

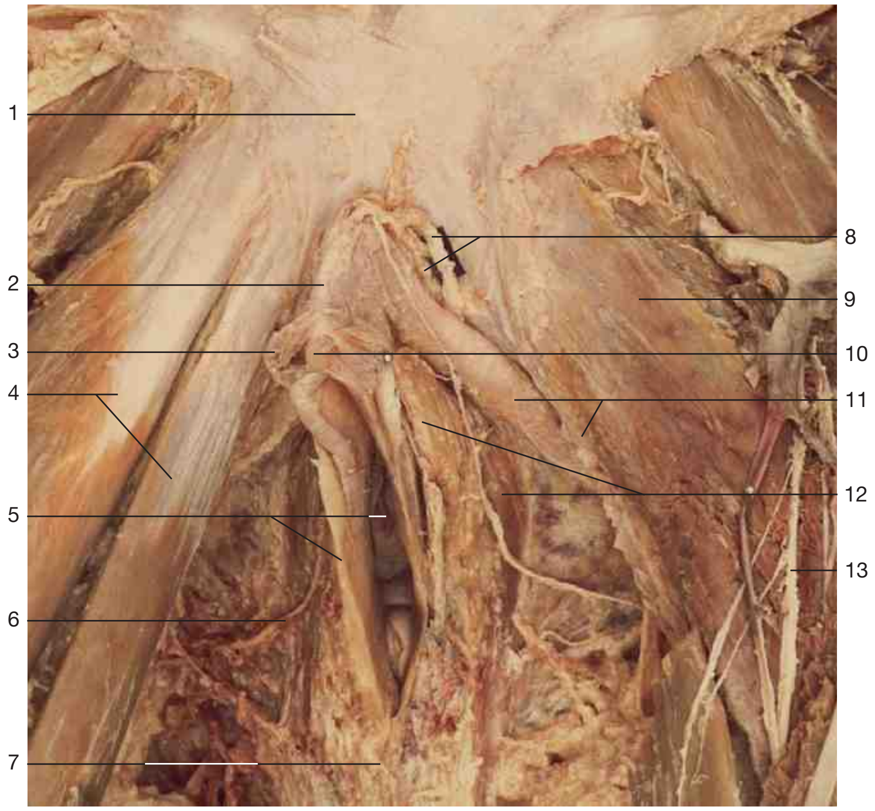


Urogenital diaphragm and external genital organs in the female, superficial layer (from below). On the right side the bulb of vestibule has been removed.

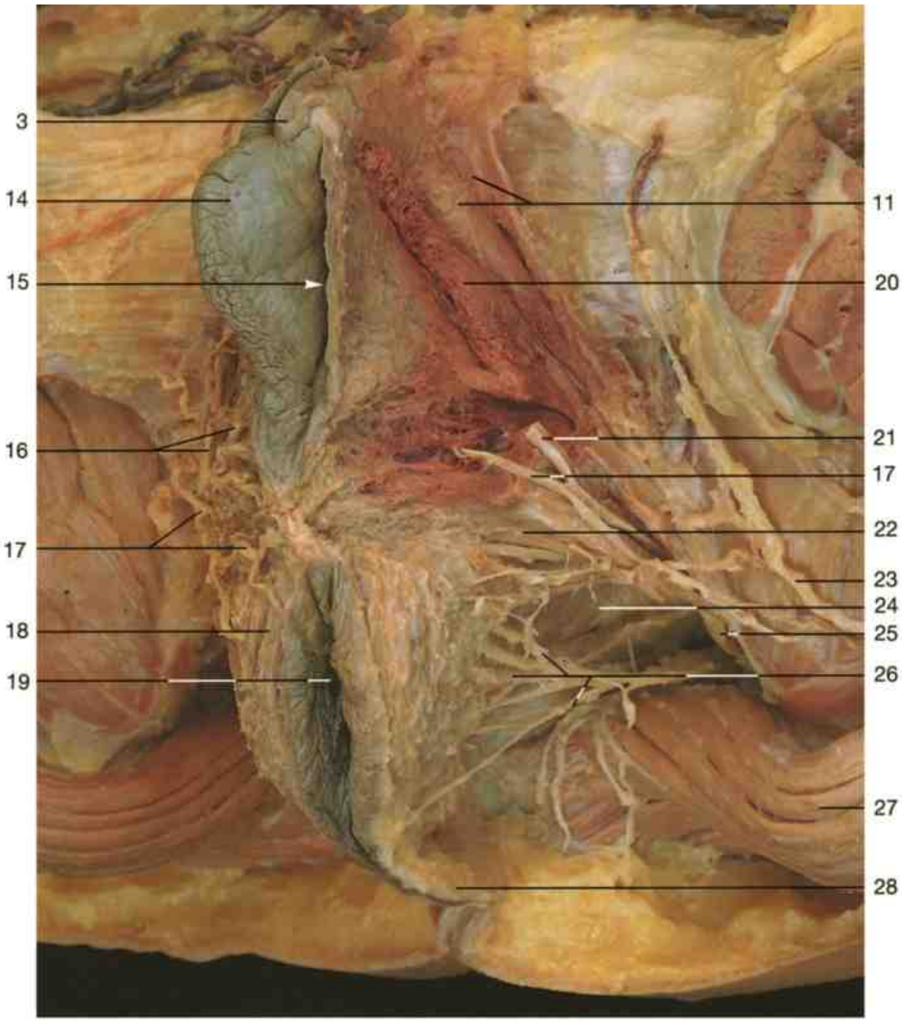


External female genital organs. Position of arteries and nerves; bulb of vestibule in blue (schematic drawing).

1	Prepuce of clitoris
2	Labium minus
3	Vaginal orifice
4	Deep transverse perineus muscle
5	Dorsal nerve of clitoris
6	Posterior labial nerves
7	Great adductor muscle
8	Perineal branches of pudendal nerve
9	Anus and external anal sphincter muscle
10	Inferior cluneal nerves
11	Mons pubis
12	Crus of clitoris with ischiocavernosus muscle
13	Bulb of vestibule
14	Superficial transverse perineus muscle
15	Pudendal nerve and internal pudendal artery
16	Inferior rectal nerves
17	Levator ani muscle
18	Gluteus maximus muscle
19	Anococcygeal ligament
20	External urethral orifice
21	Glans of clitoris

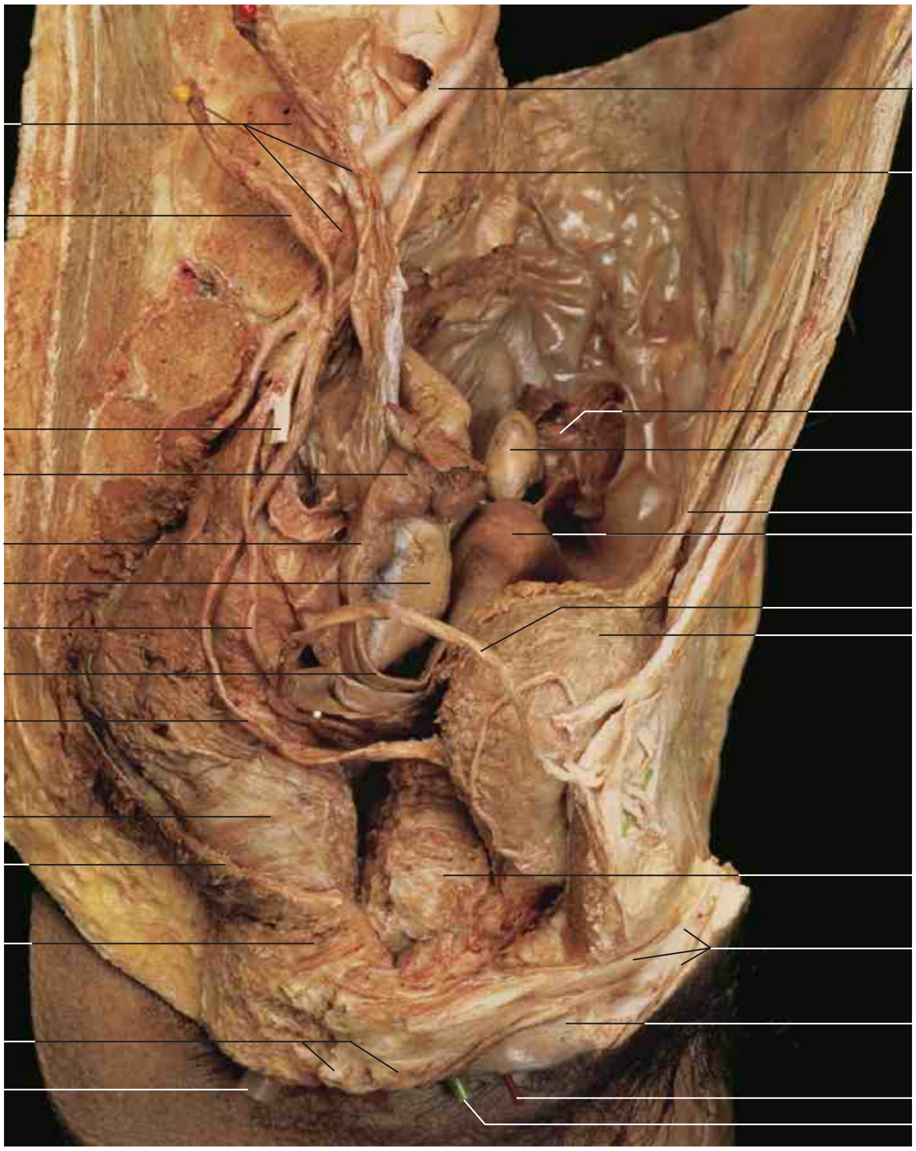


External genital organs in the female (inferior aspect). The clitoris has been dissected and slightly reflected to the right. The prepuce of clitoris has been divided to display the glans.



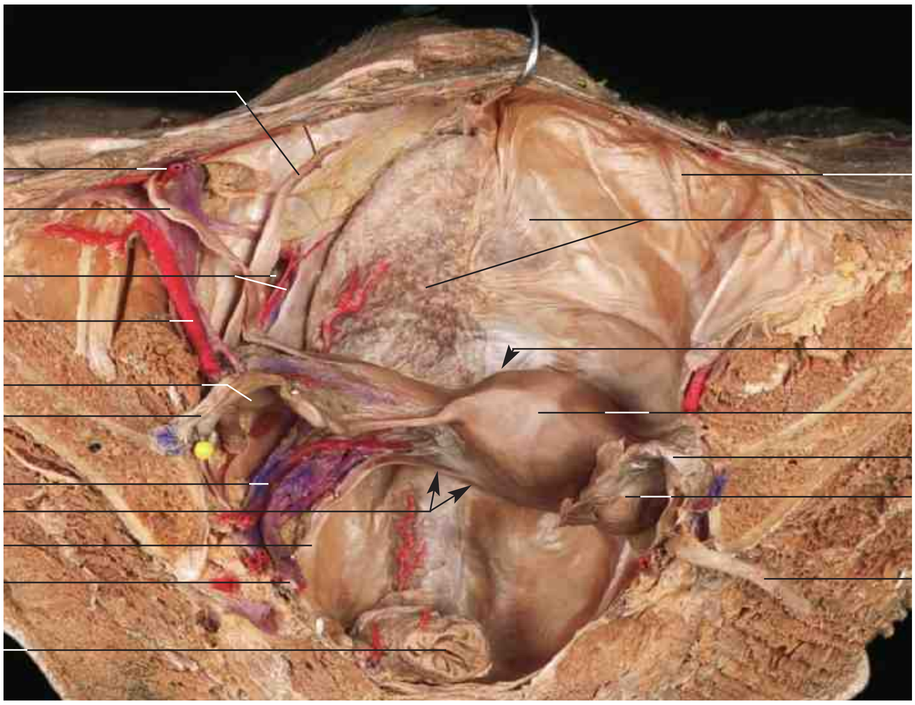
Urogenital diaphragm and external genital organs in the female (latero-inferior aspect). The bulb of vestibule has partly been removed; the left labium minus was cut away.

1 Position of pubic symphysis
2 Body of clitoris
3 Prepuce of clitoris
4 Adductor longus and gracilis muscles
5 External orifice of vagina and labium minus
6 Posterior labial nerve
7 Perineal body
8 Deep artery of clitoris and dorsal nerve of clitoris
9 Adductor brevis muscle
10 Glans of clitoris
11 Crus of clitoris and ischiocavernosus muscle
12 Bulb of vestibule and bulbospongiosus muscle
13 Anterior branch of obturator nerve
14 Labium minus
15 Vaginal orifice
16 Posterior labial nerves
17 Branches of pudendal nerve
18 External sphincter of anus
19 Anus
20 Bulb of vestibule (divided)
21 Dorsal artery of clitoris
22 Superficial transverse perineus muscle
23 Perineal branch of posterior femoral cutaneous nerve
24 Levator ani muscle
25 Pudendal nerve and internal pudendal artery
26 Inferior rectal nerves
27 Gluteus maximus muscle
28 Anococcygeal ligament

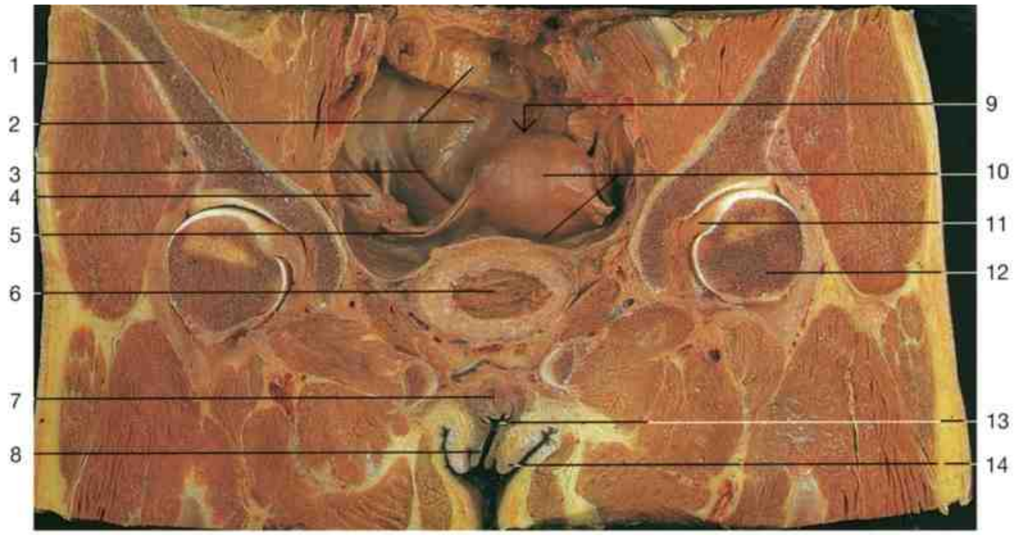


Pelvic cavity in the female, internal genital organs in situ (lateral aspect). Right half of the pelvis and sacrum have been removed.

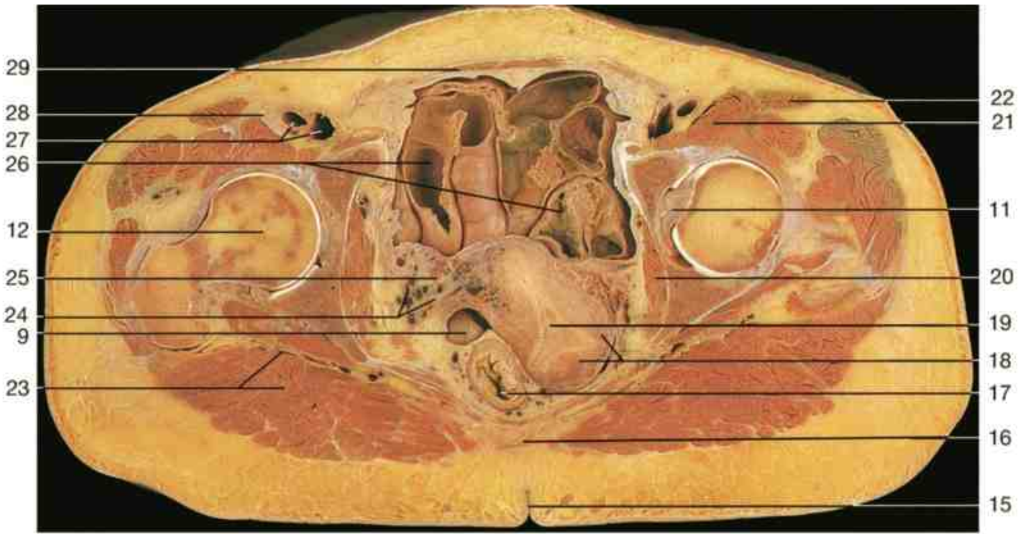
1 Body of fifth lumbar vertebra, suspensory ligament of ovary, and sacral promontory
2 Ureter
3 Medial umbilical ligament (remnant of umbilical artery) (cut)
4 Infundibulum of uterine tube
5 Ampulla of uterine tube
6 Ovary
7 Uterine artery
8 Uterine tube
9 Rectum
10 Levator ani muscle (pelvic diaphragm – cut edge)
11 External anal sphincter muscle
12 Anus (probe)
13 Internal iliac artery
14 Remnant of urachus (median umbilical ligament)
15 Uterus
16 Round ligament of uterus
17 Urinary bladder
18 Vagina
19 Clitoris
20 Labium minus
21 External orifice of urethra (red probe)
22 Vaginal orifice (green probe)
23 Lateral umbilical ligament
24 Inferior epigastric artery
25 Obturator artery, vein, and nerve
26 External iliac artery
27 Recto-uterine pouch (of Douglas)
28 Recto-uterine fold
29 Vesico-uterine pouch
30 Suspensory ligament of ovary
31 Greater vestibular gland and bulb of the vestibule



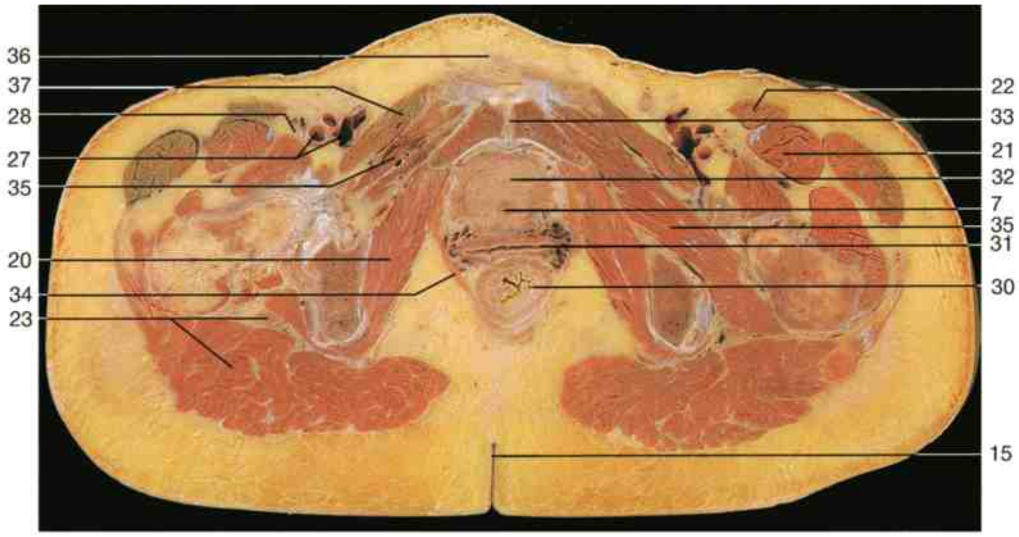
Pelvic cavity in the female, internal genital organs in situ (seen from above). The peritoneum at the left half of pelvic cavity has been removed to display uterine tube, vessels, and nerves.



Coronal section through the pelvic cavity of the female (cf. MRI scan on p. 355).



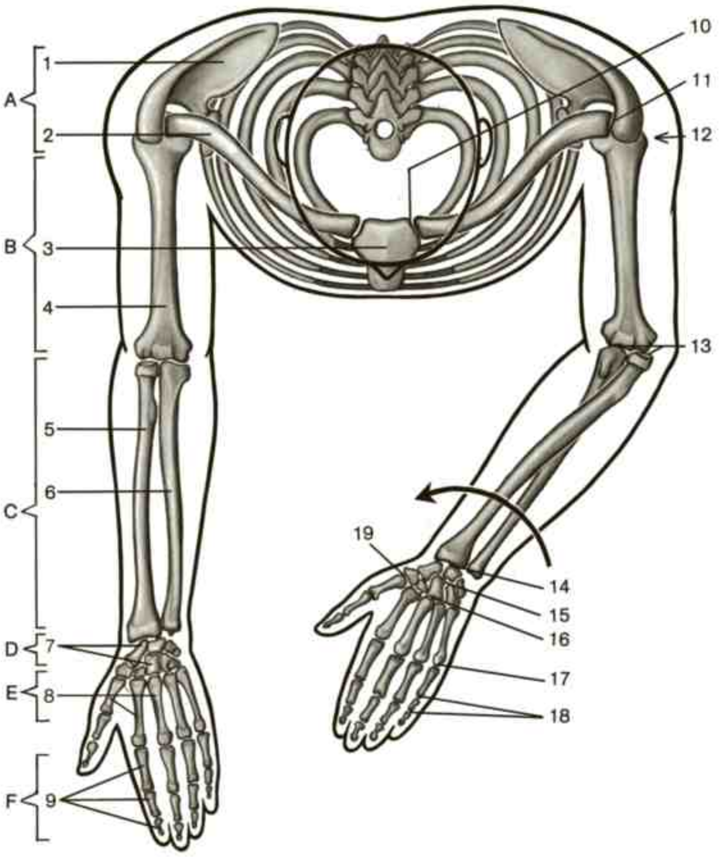
Horizontal section through the pelvic cavity of the female at level of uterus (from below). The uterus is retroverted to the left.



Horizontal section through the pelvic cavity of the female at level of the urethral sphincter and vagina (from below).

1	Ilium
2	Rectum
3	Recto-uterine fold
4	Ovary
5	Uterine tube
6	Urinary bladder
7	Urethra
8	Labium minus
9	Recto-uterine pouch of Douglas
10	Uterus (uterovesical pouch)
11	Ligament of the head of the femur
12	Head of femur
13	Vestibule of vagina
14	Labium majus
15	Anal cleft
16	Coccyx
17	Rectum
18	Myometrium of uterus
19	Uterine cavity
20	Obturator internus muscle
21	Iliopsoas muscle
22	Sartorius muscle
23	Sciatic nerve and gluteus maximus muscle
24	Uterine venous plexus
25	Broad ligament
26	Small intestine
27	Femoral artery and vein
28	Femoral nerve
29	Pyramidalis muscle
30	Rectum (anal canal)
31	Vagina
32	Urethral sphincter muscle (base of urinary bladder)
33	Pubic symphysis
34	Levator ani muscle
35	Obturator externus muscle
36	Mons pubis
37	Pectineus muscle

7 Upper Limb



A = Shoulder girdle
B = Arm
C = Forearm
D = Wrist
E = Palm of hand
F = Finger

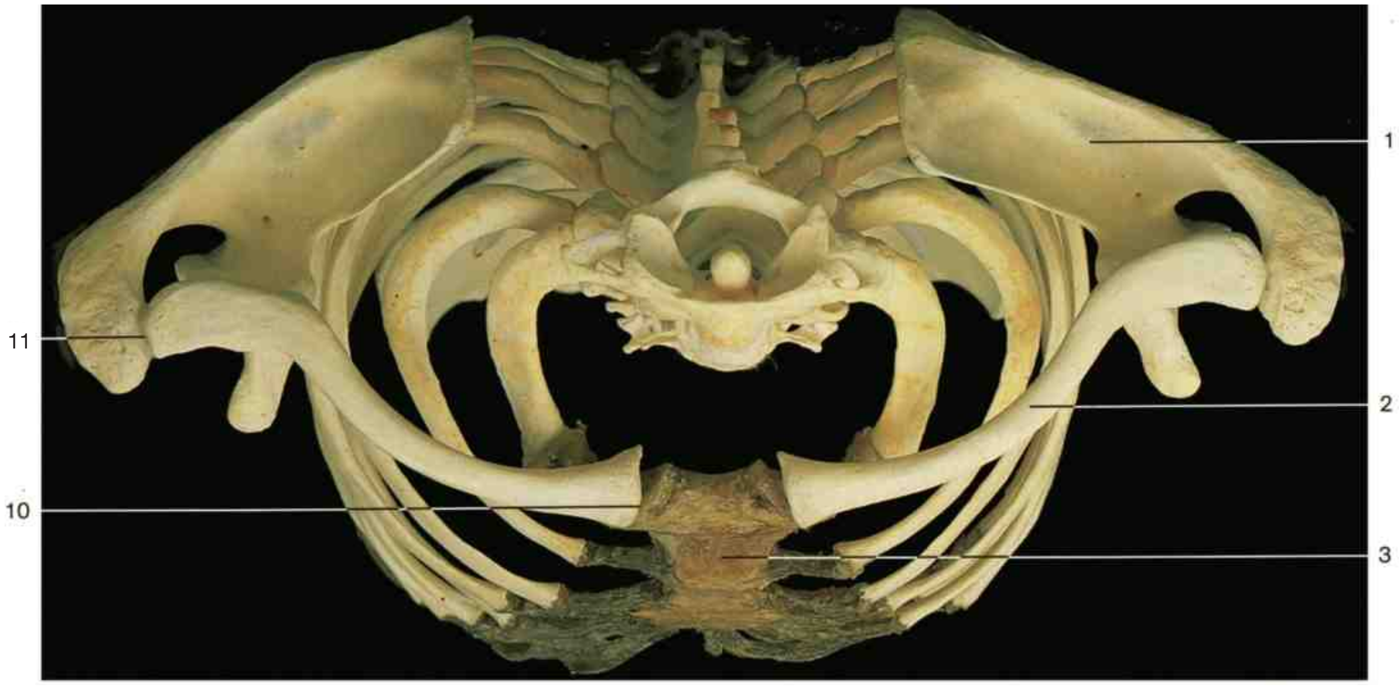
Bones

1	Scapula
2	Clavicle
3	Sternum
4	Humerus
5	Radius
6	Ulna
7	Carpal bones
8	Metacarpal bones
9	Phalanges

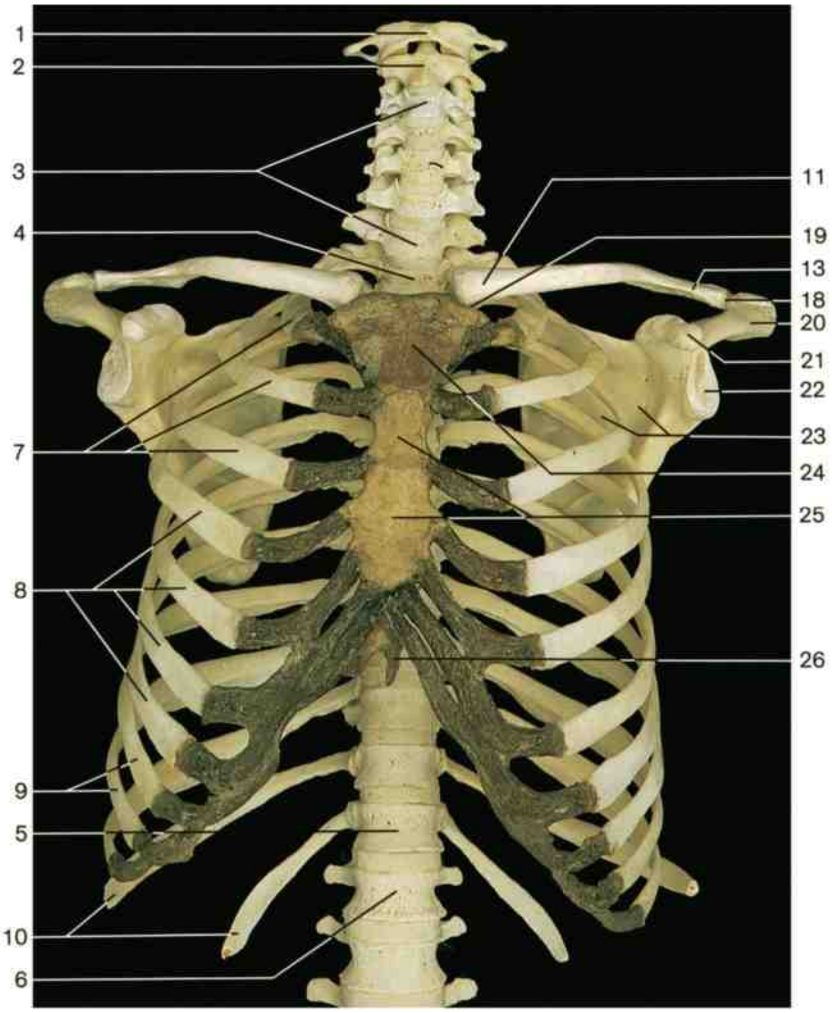
Joints

10	Sternoclavicular joint
11	Acromioclavicular joint
12	Shoulder joint
13	Elbow joint
14	Wrist joint
15	Midcarpal joint
16	Carpometacarpal joint
17	Metacarpophalangeal joint
18	Interphalangeal joints of the hand
19	Carpometacarpal joint of thumb

Organization of shoulder girdle and upper limb (superior aspect). The two positions of the forearm essential to manual skills in the human, supination (right arm) and pronation (left arm), are shown.



Bones of shoulder girdle articulated with the thorax (superior aspect).



Skeleton of shoulder girdle and thorax (anterior aspect). The cartilaginous parts of the ribs appear dark brown.

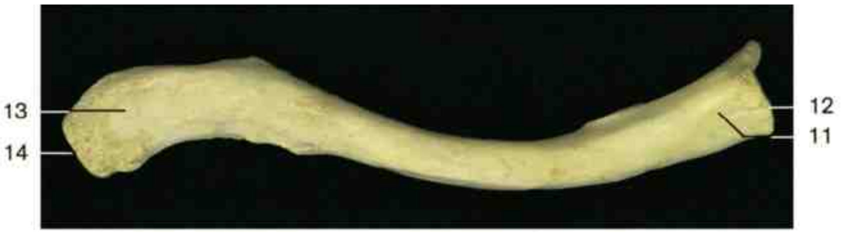
Vertebral column
1 Atlas
2 Axis
3 Third–seventh cervical vertebrae
4 First thoracic vertebra
5 Twelfth thoracic vertebra
6 First lumbar vertebra

Ribs
7 First–third ribs } True ribs
8 Fourth–seventh ribs }
9 Eighth–tenth ribs } False ribs
10 Eleventh and twelfth ribs (floating ribs) }

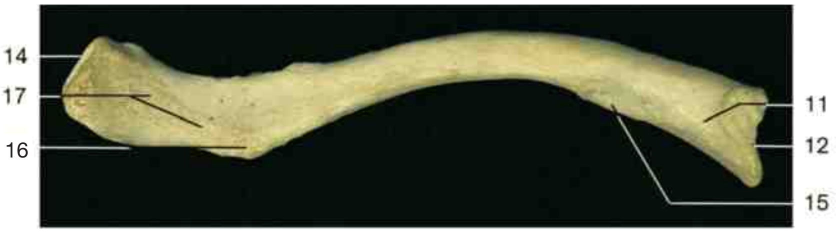
Clavicle
11 Sternal end
12 Articular facet for sternum
13 Acromial end
14 Articular facet for acromion
15 Impression for costoclavicular ligament
16 Conoid tubercle
17 Trapezoid line
18 Site of acromioclavicular joint
19 Site of sternoclavicular joint

Scapula
20 Acromion
21 Coracoid process
22 Glenoid cavity
23 Costal surface

Sternum
24 Manubrium
25 Body
26 Xiphoid process

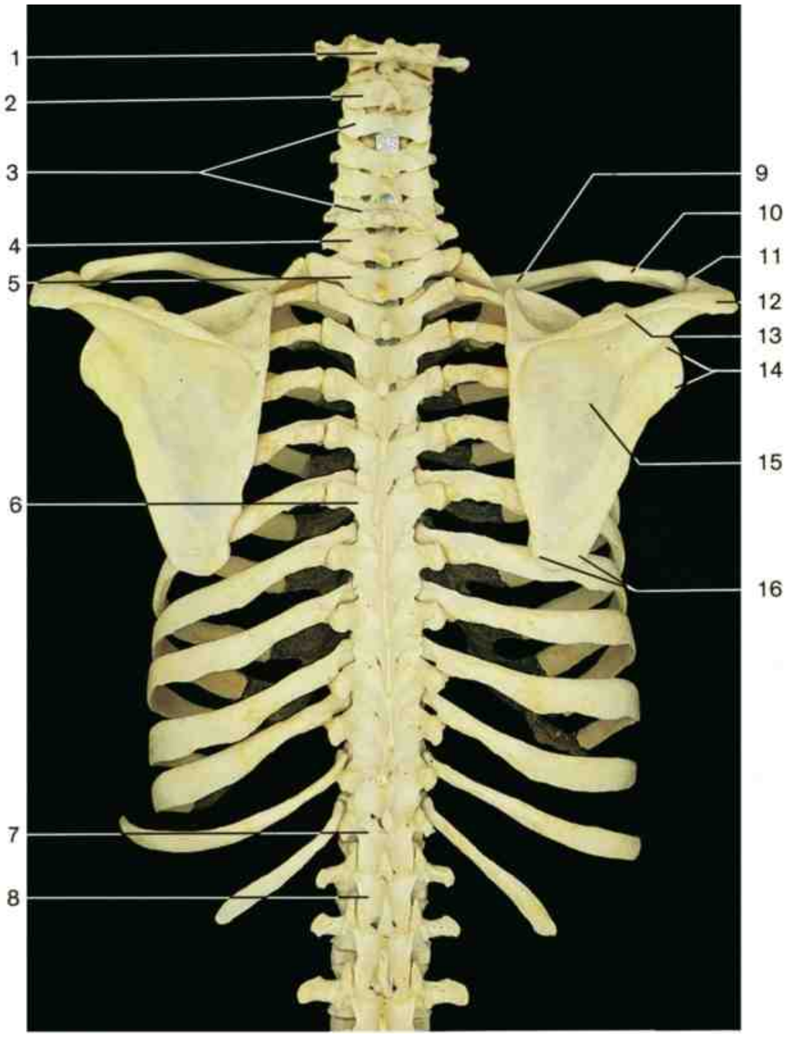


Right clavicle (superior aspect).

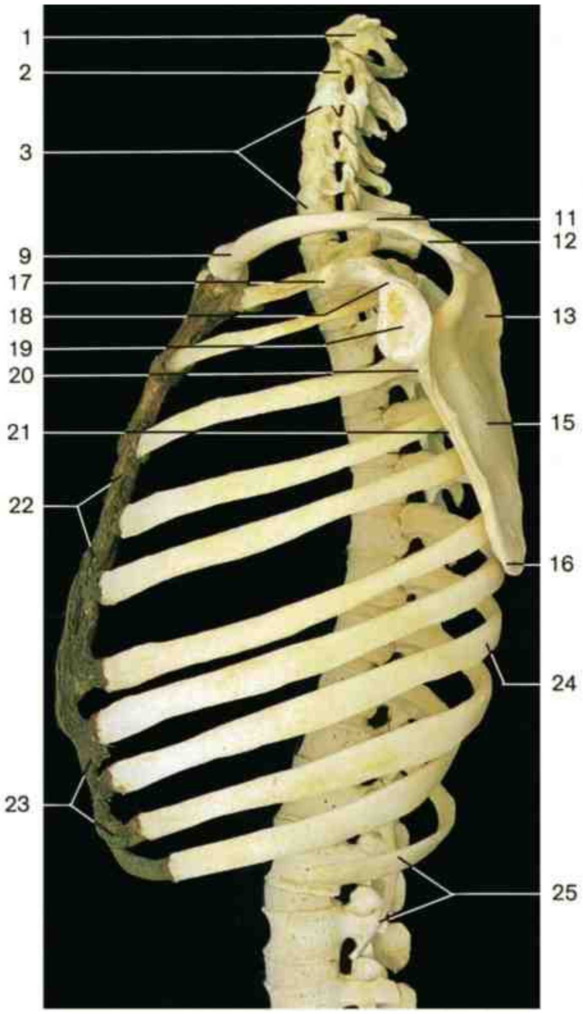


Right clavicle (inferior aspect).

Because of the human body's upright posture, the upper limb has developed a high degree of mobility. The shoulder girdle is to a great extent movable in the thorax and is connected with the trunk only by the sternoclavicular joint. A further characteristic of the forearm is the capacity for rotation (i.e., pronation and supination).



Skeleton of shoulder girdle and thorax (posterior aspect).



Skeleton of shoulder girdle and thorax (lateral aspect).

Vertebral column

1 Atlas
2 Axis
3 Third–sixth cervical vertebrae
4 Seventh vertebra (vertebra prominens)
5 First thoracic vertebra
6 Sixth thoracic vertebra
7 Twelfth thoracic vertebra
8 First lumbar vertebra

Clavicle

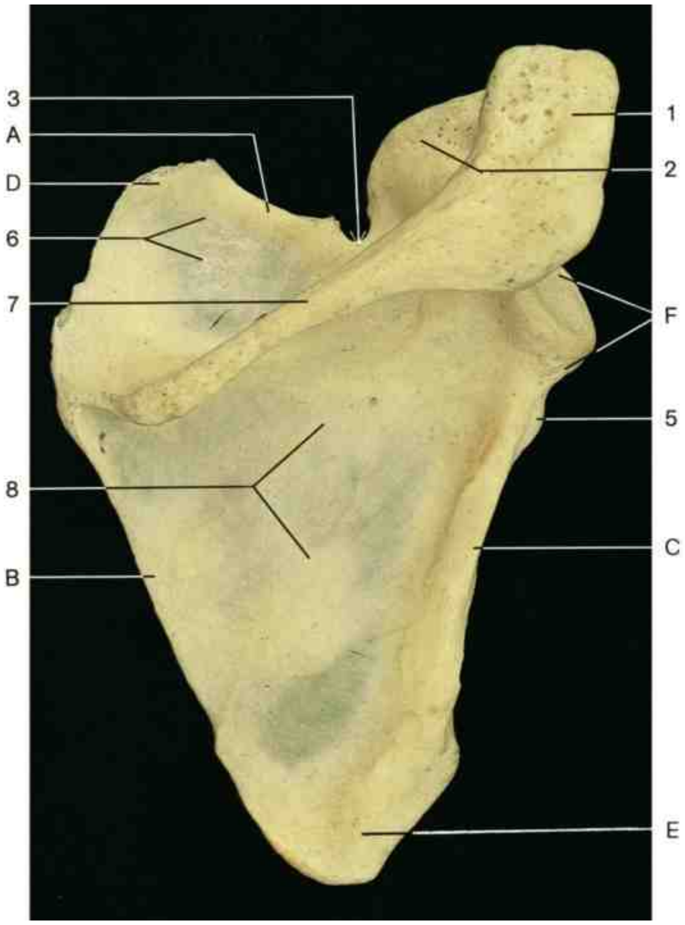
9 Sternal end
10 Acromial end
11 Site of acromioclavicular joint

Scapula

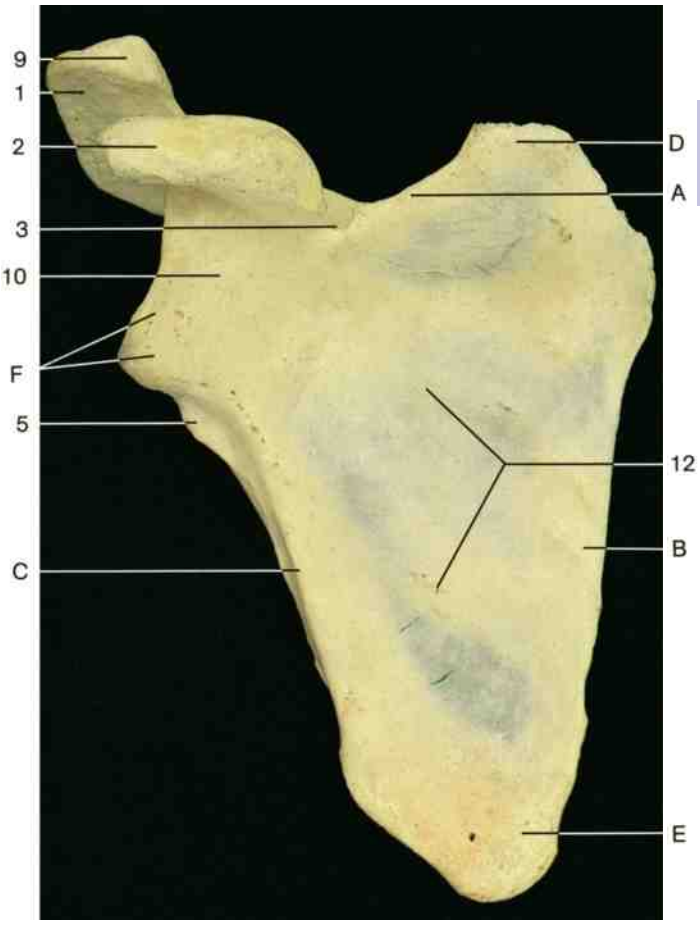
12 Acromion
13 Spine of scapula
14 Lateral angle
15 Posterior surface
16 Inferior angle
17 Coracoid process
18 Supraglenoid tubercle
19 Glenoid cavity
20 Infraglenoid tubercle
21 Lateral margin

Thorax

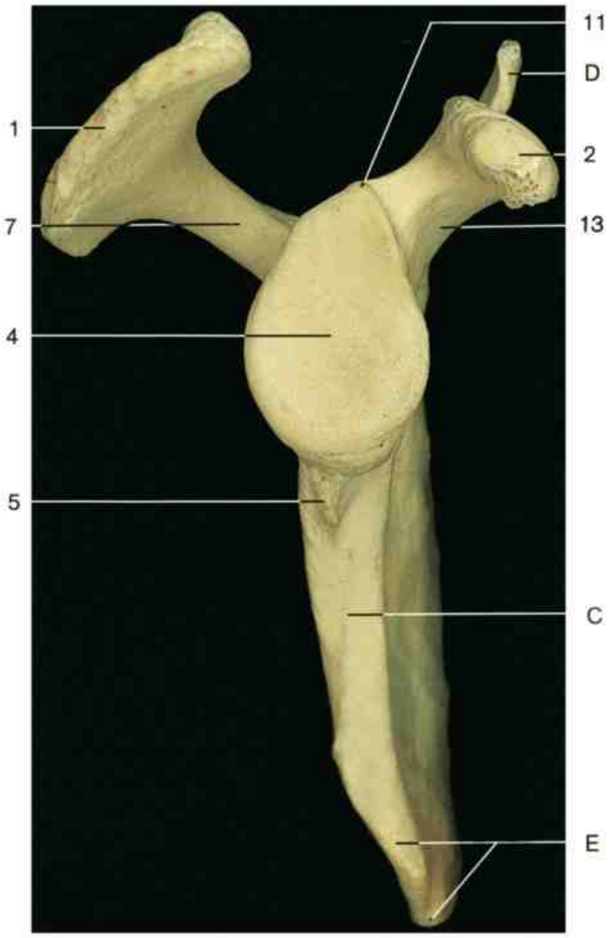
22 Body of sternum
23 Costal arch
24 Angle of ribs
25 Floating ribs



Right scapula (posterior aspect).



Right scapula (anterior aspect, costal surface).

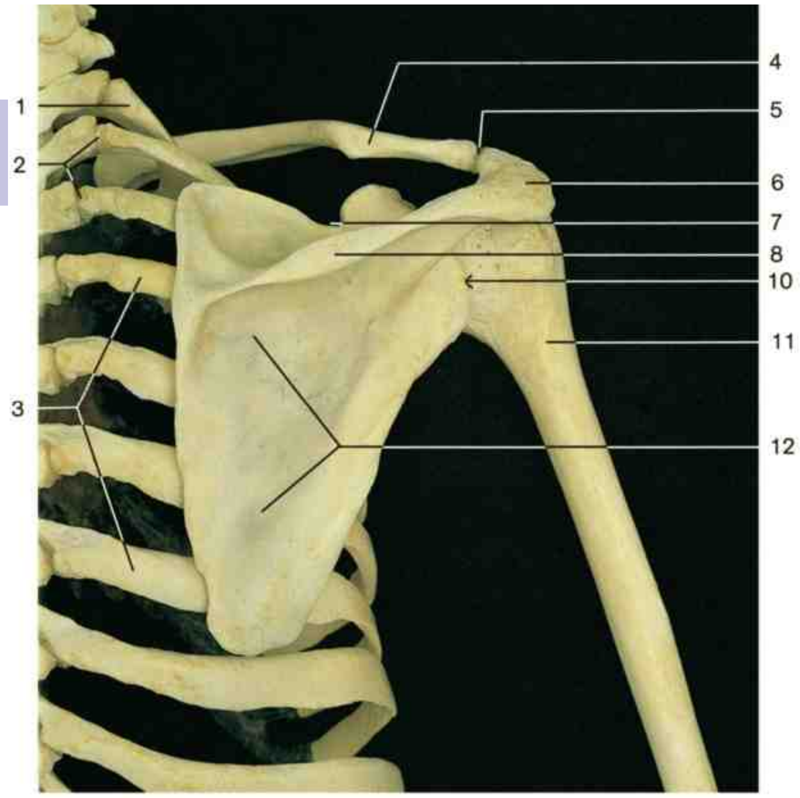


Right scapula (lateral aspect).

Scapula

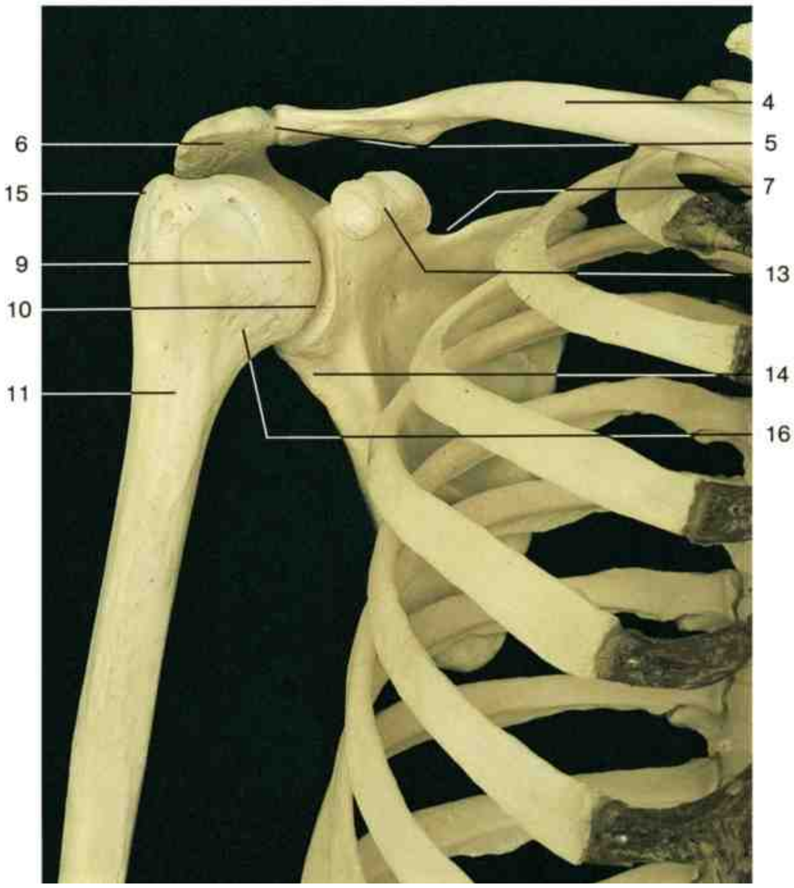
A = superior border
B = medial border
C = lateral border
D = superior angle
E = inferior angle
F = lateral angle

1 Acromion
2 Coracoid process
3 Scapular notch
4 Glenoid cavity
5 Infraglenoid tubercle
6 Supraspinous fossa
7 Spine
8 Infraspinous fossa
9 Articular facet for acromion
10 Neck
11 Supraglenoid tubercle
12 Costal (anterior) surface
13 Base of coracoid process

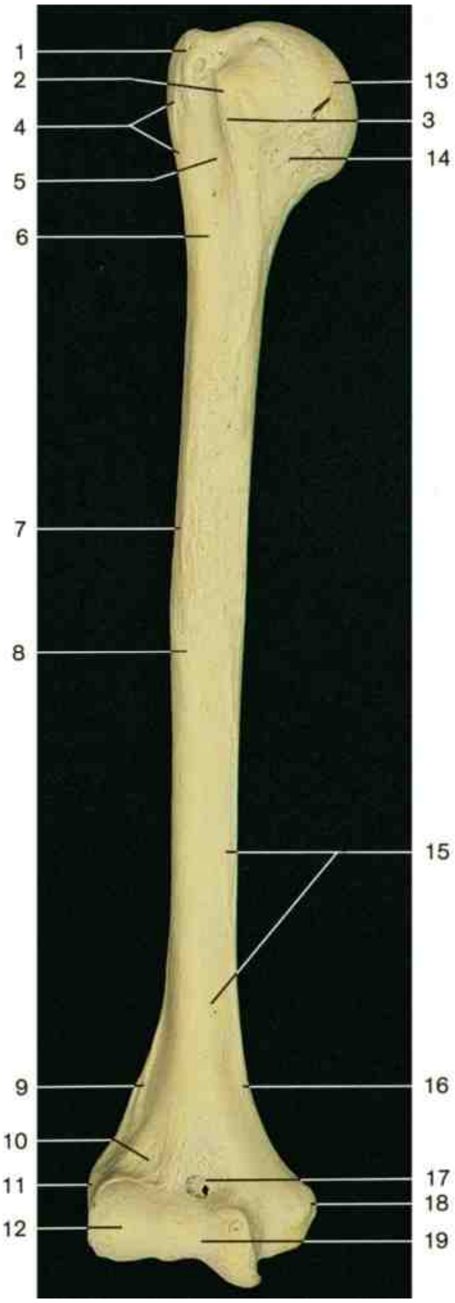


Bones of shoulder joint (posterior aspect).

1 First rib
2 Position of costotransverse joints
3 Fourth–seventh ribs
4 Clavicle
5 Position of acromioclavicular joint
6 Acromion
7 Scapular notch
8 Spine of scapula
9 Head of humerus
10 Glenoid cavity
11 Surgical neck of humerus
12 Posterior surface of scapula
13 Coracoid process
14 Infraglenoid tubercle
15 Greater tubercle of humerus
16 Anatomical neck of humerus



Bones of shoulder joint (anterior aspect).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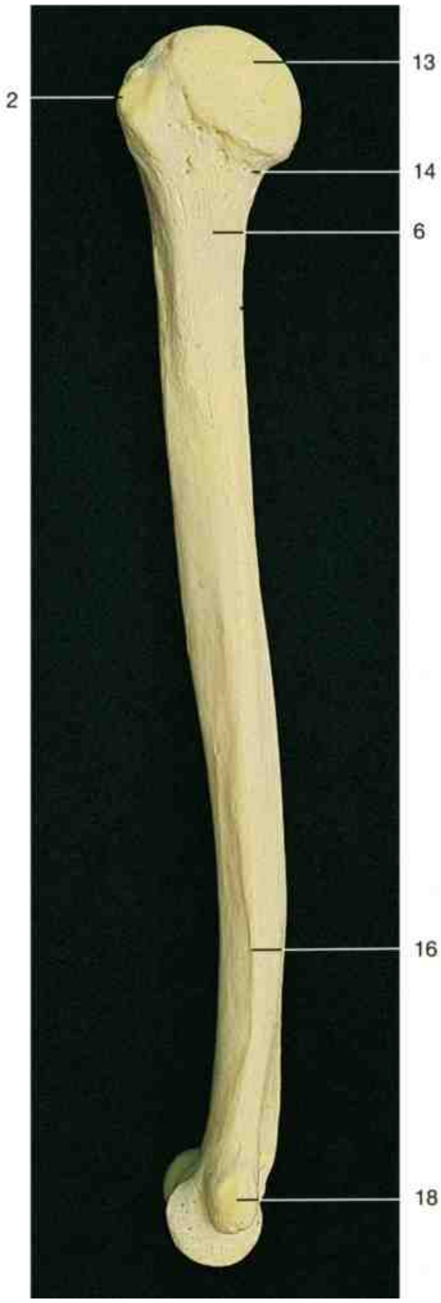
Right humerus (anterior aspect).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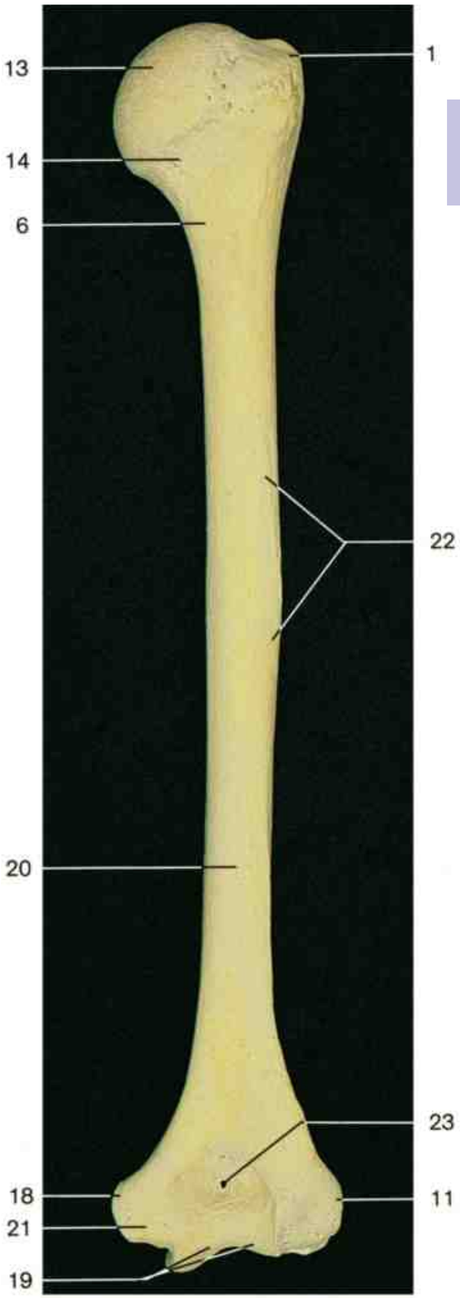
Right humerus (medial aspect).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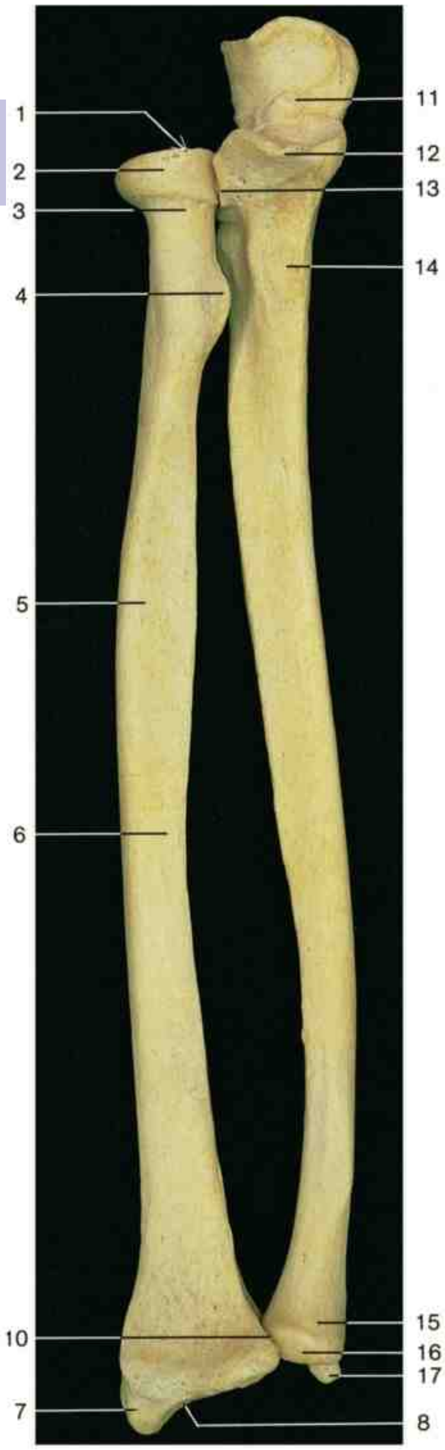
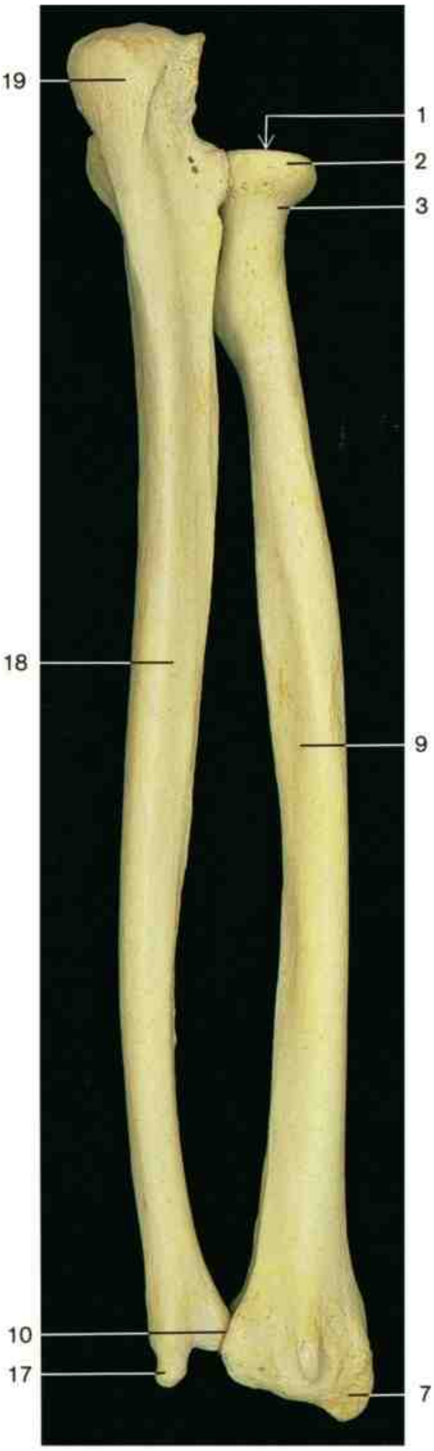
Right humerus (posterior aspect).

Humerus

1 Greater tubercle
2 Lesser tubercle
3 Crest of lesser tubercle
4 Crest of greater tubercle
5 Intertubercular sulcus
6 Surgical neck
7 Deltoid tuberosity
8 Anterolateral surface
9 Lateral supracondylar ridge
10 Radial fossa
11 Lateral epicondyle
12 Capitulum
13 Head
14 Anatomical neck
15 Anteromedial surface
16 Medial supracondylar ridge
17 Coronoid fossa
18 Medial epicondyle
19 Trochlea
20 Posterior surface
21 Groove for ulnar nerve
22 Groove for radial nerve
23 Olecranon fossa



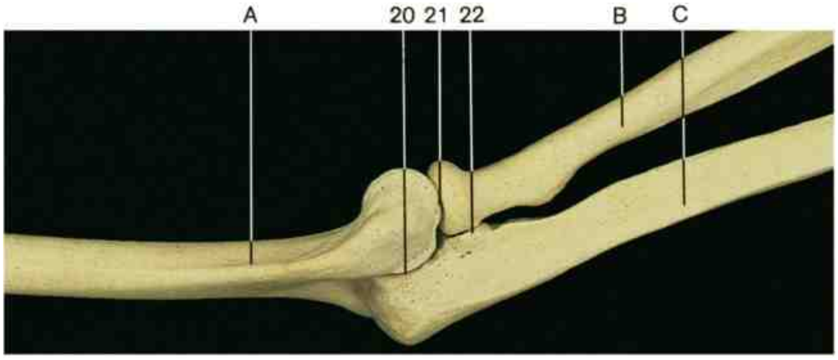
Bones of right forearm, radius, and ulna (anterior aspect).



Bones of right forearm, radius, and ulna (posterior aspect).

Radius
1 Head
2 Articular circumference
3 Neck
4 Radial tuberosity
5 Shaft
6 Anterior surface
7 Styloid process
8 Articular surface
9 Posterior surface
10 Ulnar notch

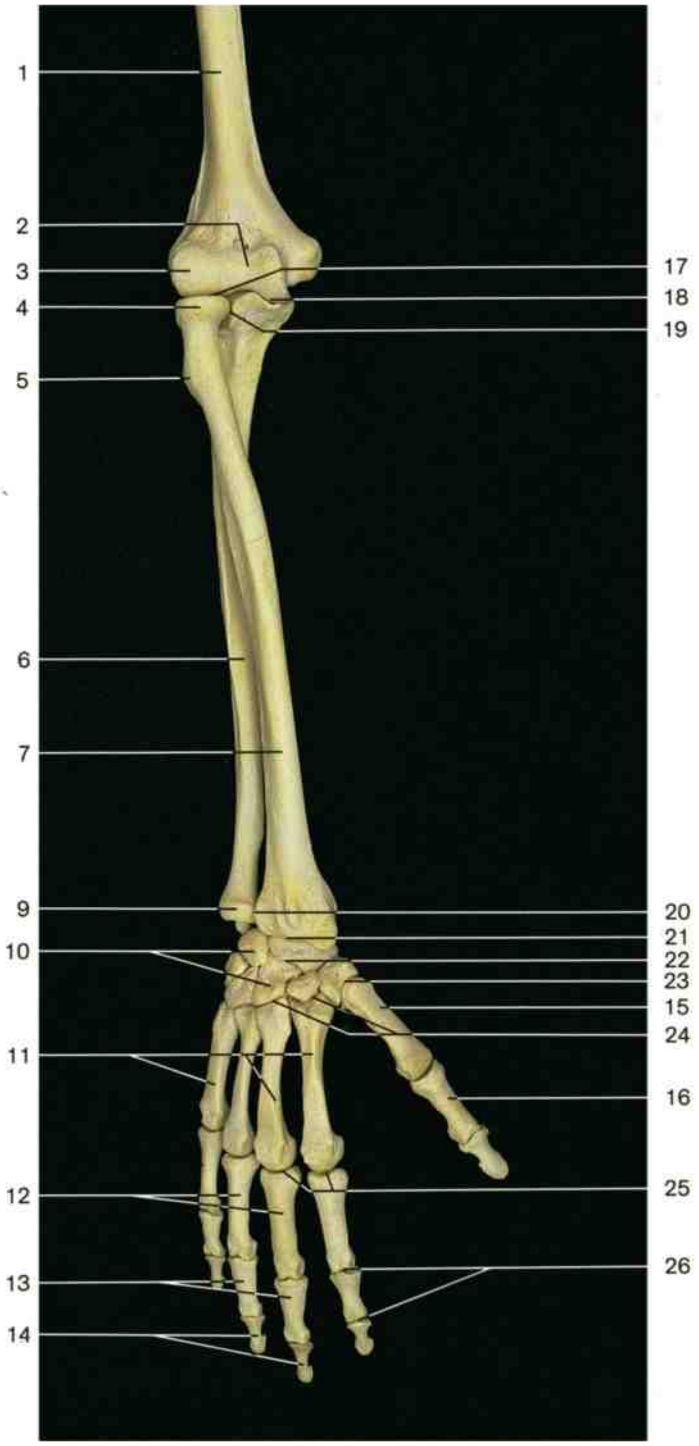
Ulna
11 Trochlear notch
12 Coronoid process
13 Radial notch
14 Ulnar tuberosity
15 Head
16 Articular circumference
17 Styloid process
18 Posterior surface
19 Olecranon



Bones of right elbow joint (lateral aspect).

Articulations at the right elbow
20 Site of humero-ulnar joint
21 Site of humeroradial joint
22 Site of proximal radio-ulnar joint

A = humerus
B = radius
C = ulna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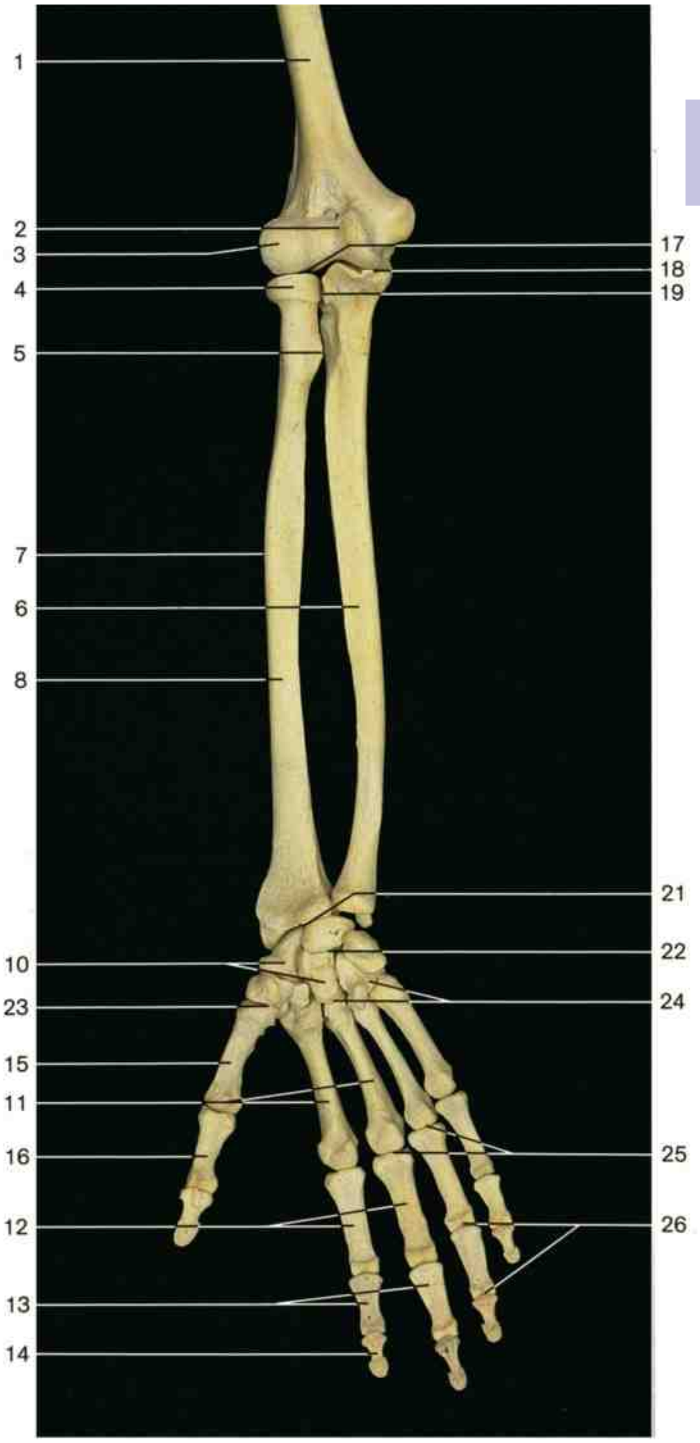
Skeleton of right forearm and hand in pronation.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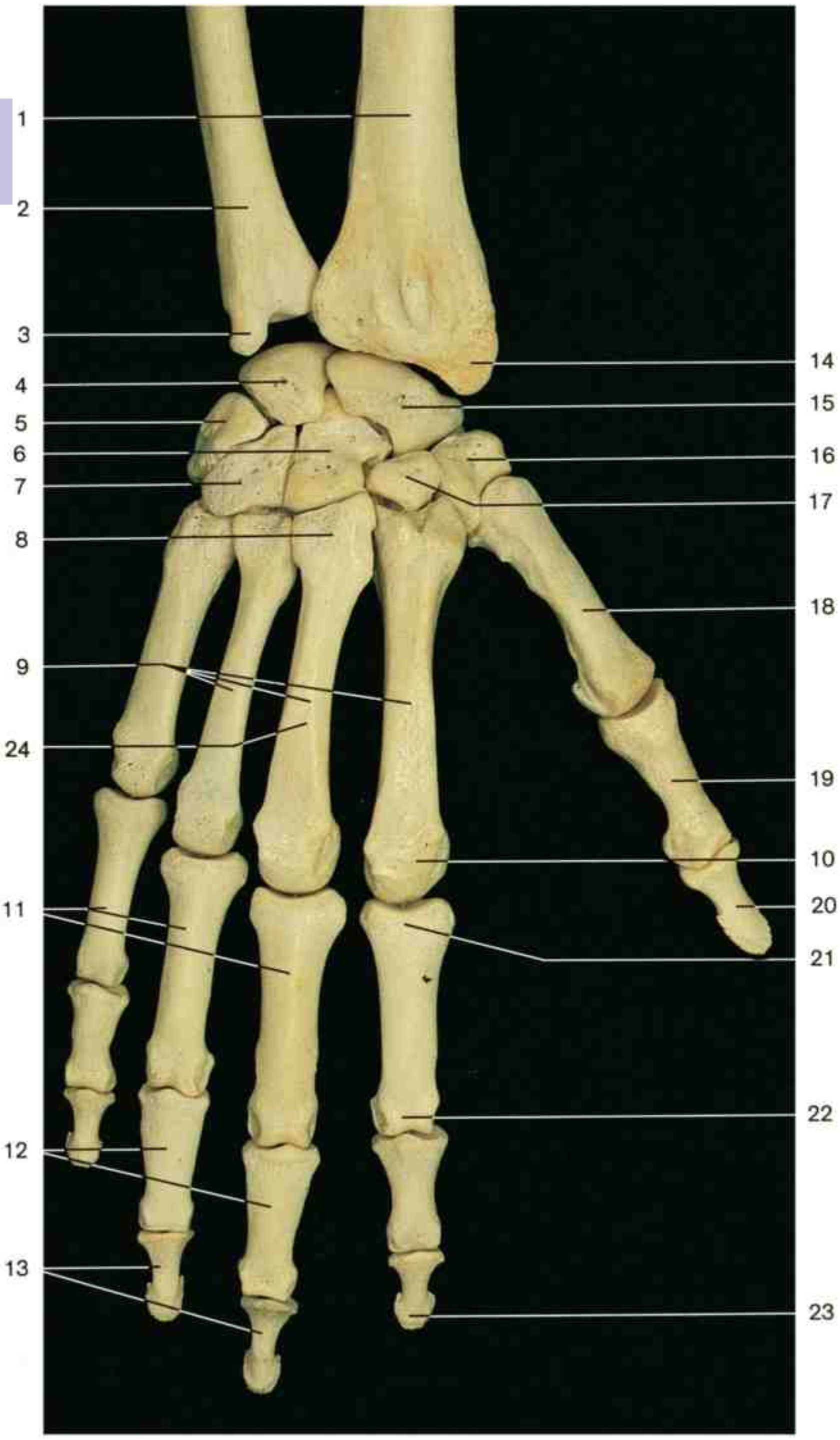
Skeleton of right forearm and hand in supination.

1 Humerus
2 Trochlea of humerus
3 Capitulum of humerus
4 Articular circumference of radius
5 Radial tuberosity
6 Anterior surface of ulna
7 Posterior surface of radius
8 Anterior surface of radius

9 Articular circumference of ulna
10 Carpal bones
11 Metacarpal bones
12 Proximal phalanges
13 Middle phalanges
14 Distal phalanges
15 Metacarpal bone of thumb
16 Proximal phalanx of thumb

Sites of joints
17 Humeroradial joint
18 Humero-ulnar joint
19 Proximal radio-ulnar joint
20 Distal radio-ulnar joint
21 Wrist joint
22 Midcarpal joint
23 Carpometacarpal joint of thumb
24 Carpometacarpal joints
25 Metacarpophalangeal joints
26 Interphalangeal joints of the hand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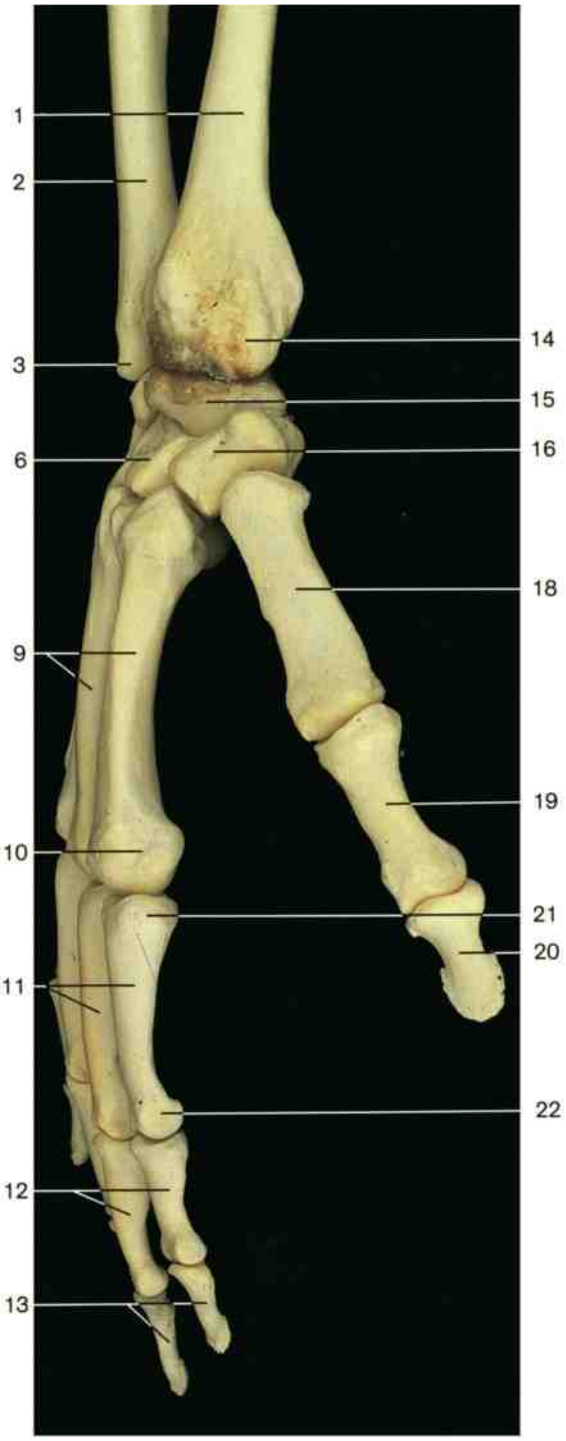
Skeleton of right wrist and hand (dorsal aspect).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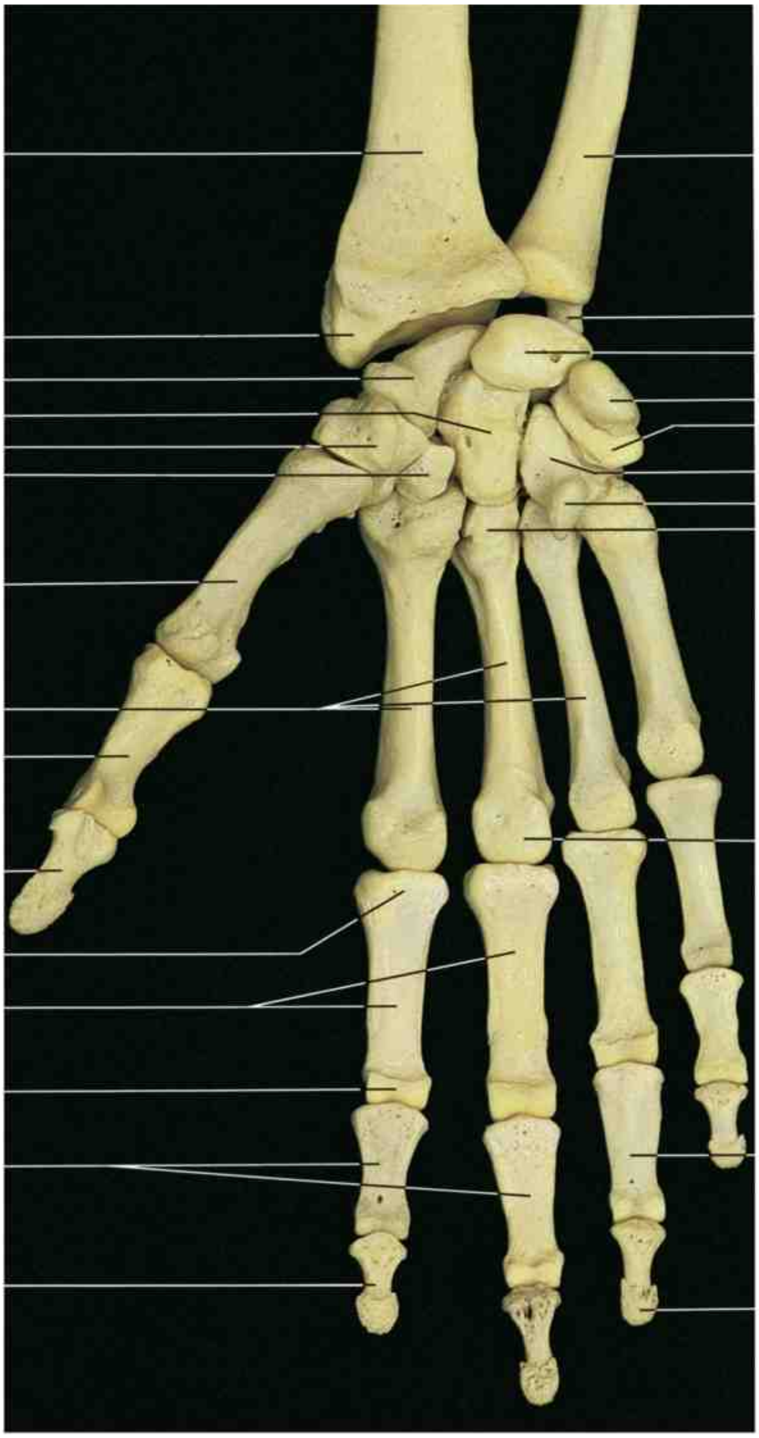
Skeleton of right wrist and hand (medial aspect).

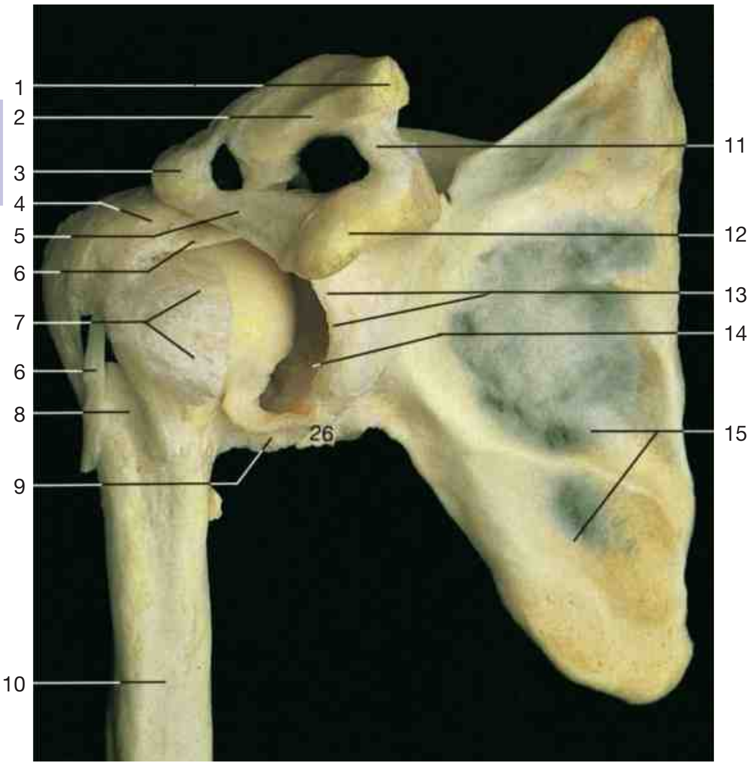
1 Radius
2 Ulna
3 Styloid process of ulna
4 Lunate bone
5 Triquetral bone
6 Capitate bone
7 Hamate bone
} Carpal bones (4–7)
8 Base of third metacarpal bone
9 Metacarpal bones
10 Head of metacarpal bone
11 Proximal phalanges of hand
12 Middle phalanges of hand
13 Distal phalanges of hand
14 Styloid process of radius
15 Scaphoid bone
16 Trapezium bone
17 Trapezoid bone
} Carpal bones (15–17)
18 Metacarpal bone of thumb
19 Proximal phalanx of thumb
20 Distal phalanx of thumb
21 Base of second proximal phalanx
22 Head of second proximal phalanx
23 Tuberosity of distal phalanx
24 Body of third metacarpal bone



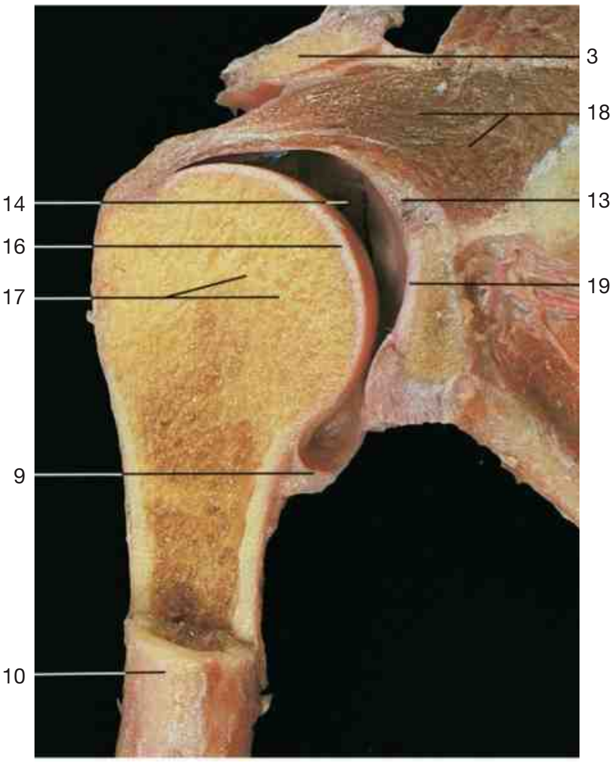
1 Radius
2 Styloid process of radius
3 Scaphoid bone
4 Capitate bone
5 Trapezium
6 Trapezoid bone
Carpal bones
7 First metacarpal bone
8 Second to fourth metacarpal bones
9 Proximal phalanx of thumb
10 Distal phalanx of thumb
11 Base of second proximal phalanx
12 Proximal phalanges
13 Head of second proximal phalanx
14 Middle phalanges
15 Distal phalanx
16 Ulna
17 Styloid process of ulna
18 Lunate bone
19 Pisiform bone
20 Triquetral bone
21 Hamate bone
Carpal bones
22 Hamulus or hook of hamate bone
23 Base of third metacarpal bone
24 Head of metacarpal bone
25 Tuberosity of distal phalanx

Skeleton of right wrist and hand (palmar aspect).

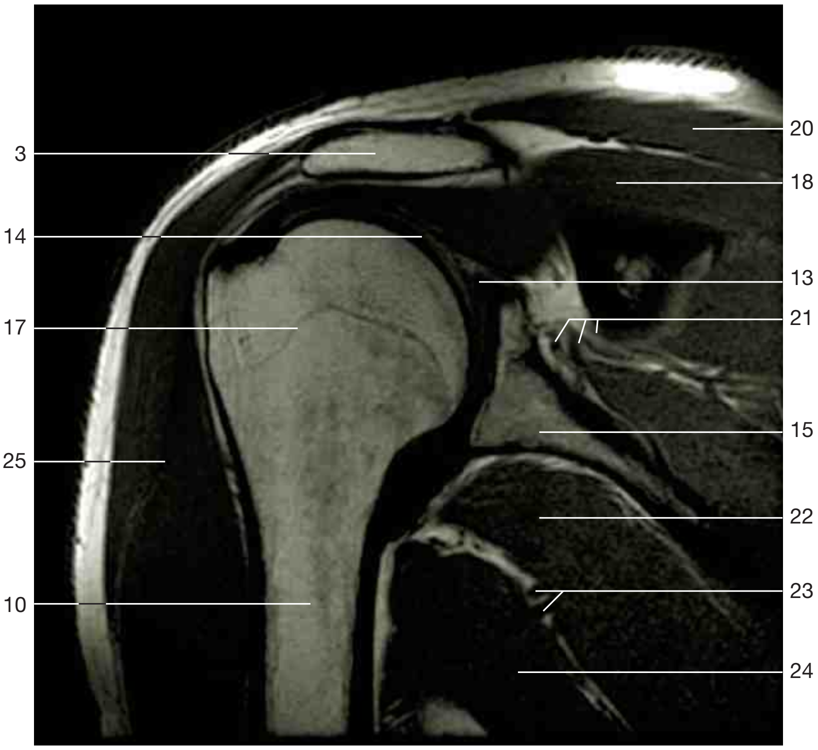
The human hand is one of the most admirable structures of the human body. The carpometacarpal joint of the thumb, a saddle joint, enjoys wide mobility so that the thumb can come into contact with all other fingers, thus enabling the hand to become an instrument for grasping and psychologic expression. During evolution, these newly developed functions appeared after the erect posture of the human body was achieved. An inevitable prerequisite for the development of human cultures is not only the differentiation of the brain but also the development of an organ capable of realizing its ideas: the human hand.



Right shoulder joint. The anterior part of the articular capsule has been removed and the head of the humerus has been slightly rotated outward to show the cavity of the joint.

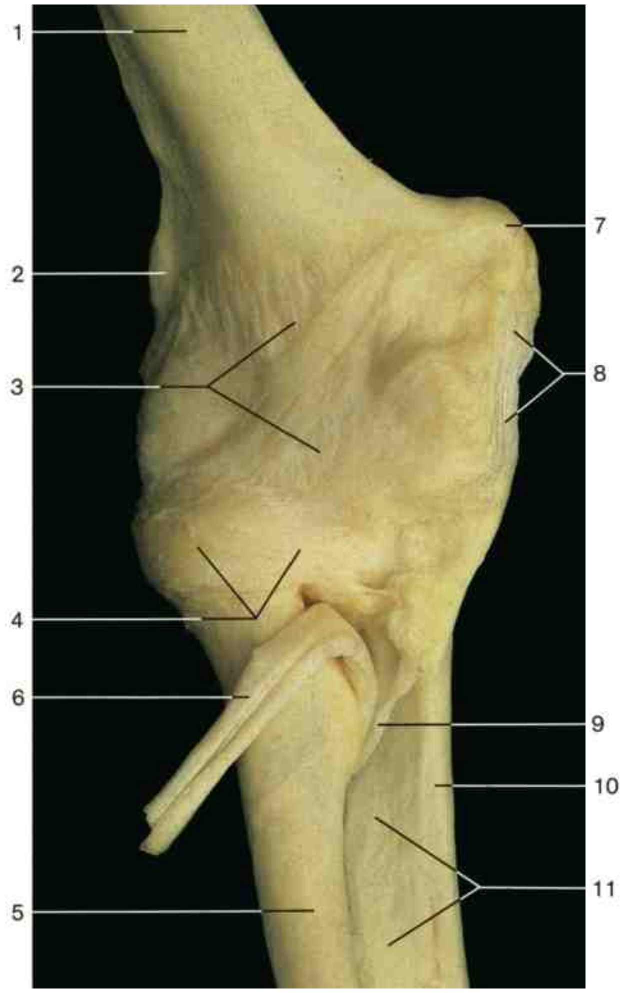


Coronal section of the right shoulder joint (anterior aspect).

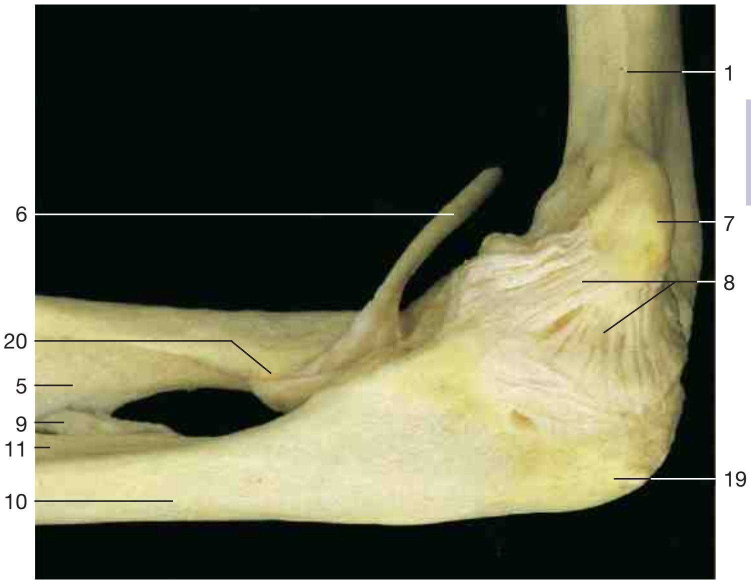


Coronal section of the right shoulder joint (MRI scan; from Heuck et al., MRT-Atlas, 2009).

1 Acromial end of clavicle
2 Acromioclavicular joint
3 Acromion
4 Tendon of supraspinatus muscle (attached to the articular capsule)
5 Coraco-acromial ligament
6 Tendon of long head of biceps brachii muscle
7 Tendon of subscapularis muscle (attached to the articular capsule)
8 Intertubercular sulcus
9 Articular capsule of shoulder joint
10 Humerus
11 Trapezoid ligament
12 Coracoid process
13 Glenoid labrum
14 Shoulder joint (joint cavity)
15 Scapula
16 Head of humerus
17 Epiphysial line
18 Supraspinatus muscle
19 Glenoid cavity
20 Trapezius muscle
21 Suprascapular artery, vein, and nerve
22 Teres major muscle
23 Circumflexa scapular artery and vein
24 Latissimus dorsi muscle
25 Deltoid muscle
26 Tendon of long head of triceps brachii muscle

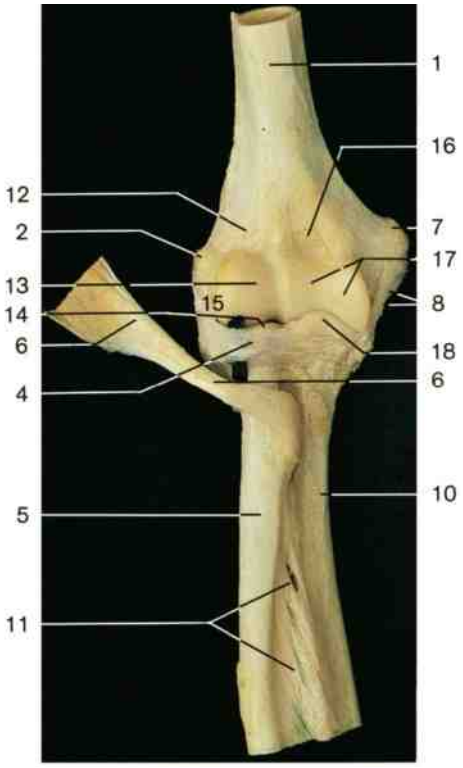


Ligaments of the elbow joint (anterior aspect).

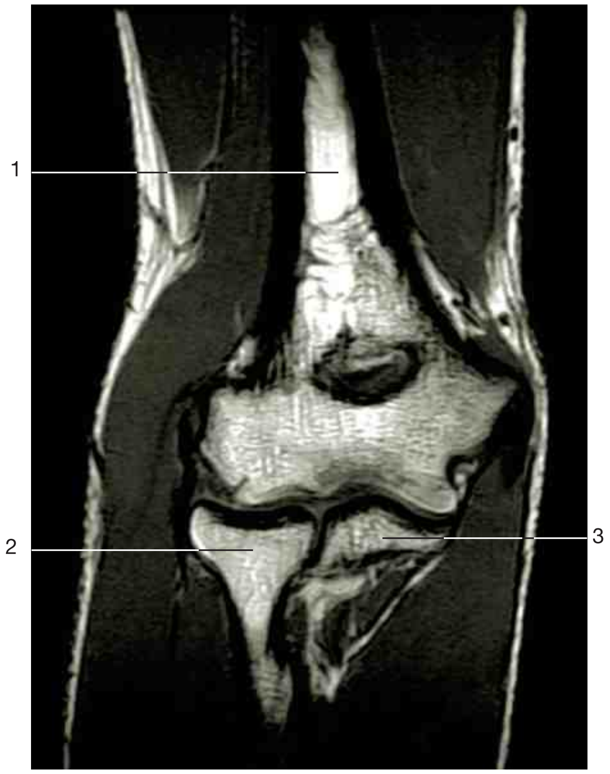


Elbow joint with collateral ligaments (medial aspect).

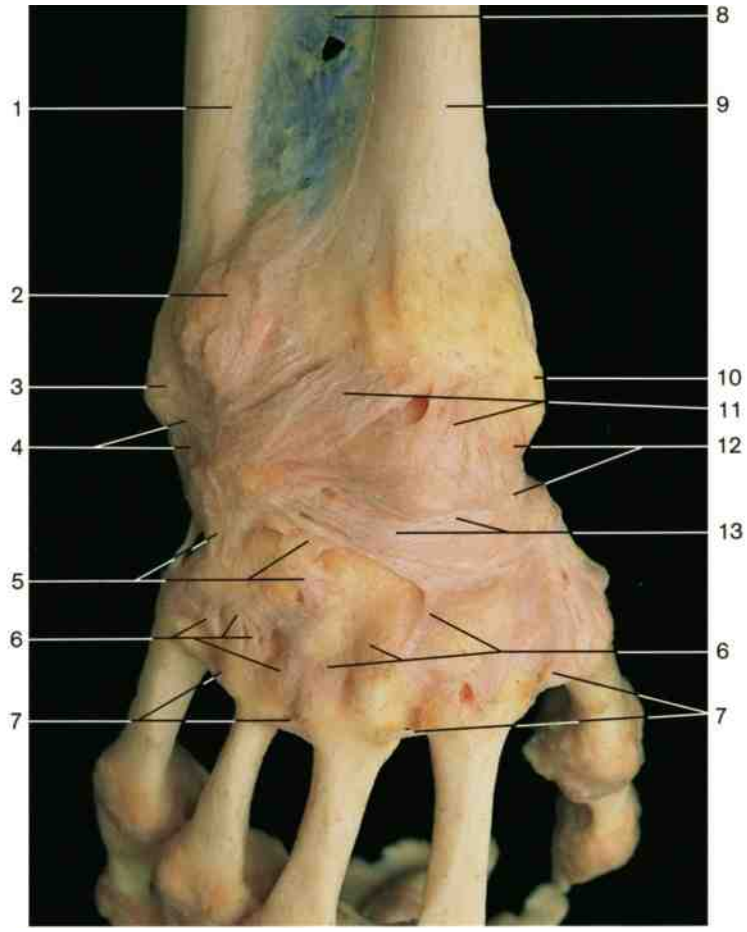
1 Humerus
2 Lateral epicondyle of humerus
3 Articular capsule
4 Anular ligament of proximal radio-ulnar joint
5 Radius
6 Tendon of biceps brachii muscle
7 Medial epicondyle of humerus
8 Ulnar collateral ligament
9 Oblique chord
10 Ulna
11 Interosseous membrane
12 Radial fossa
13 Capitulum of humerus
14 Head of radius
15 Radial collateral ligament
16 Coronoid fossa
17 Trochlea of humerus
18 Coronoid process of ulna
19 Olecranon
20 Radial tuberosity



Elbow joint with ligaments (anterior aspect). Articular capsule has been removed to show the anular ligament.

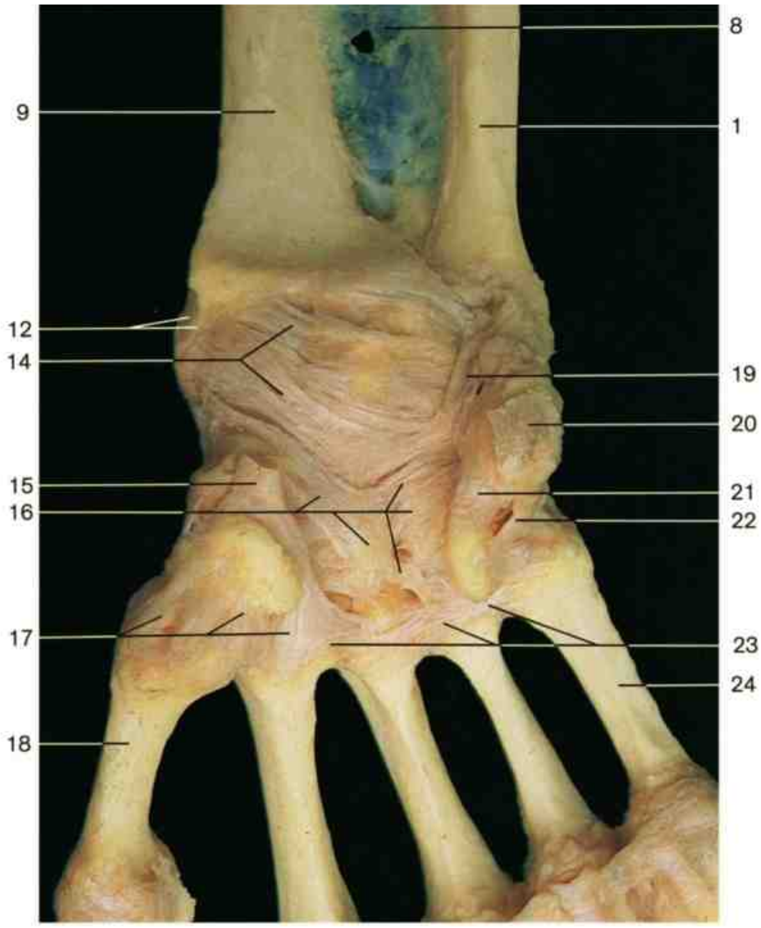


Coronal section of the elbow joint (MRI scan, courtesy of Prof. Dr. A. Heuck, Munich).

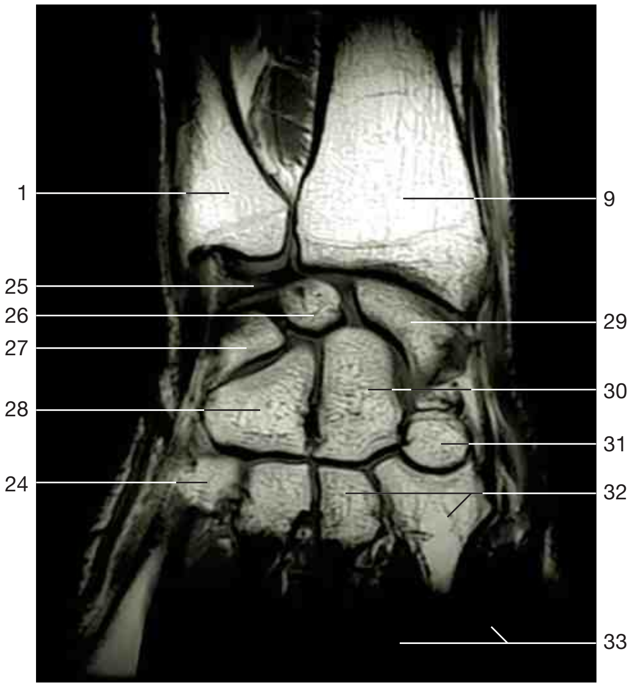


Ligaments of hand and wrist (dorsal aspect).

1 Ulna
2 Exostosis (pathological)
3 Head of ulna
4 Ulnar carpal collateral ligament
5 Deep intercarpal ligaments
6 Dorsal carpometacarpal ligaments
7 Dorsal metacarpal ligaments
8 Interosseous membrane
9 Radius
10 Styloid process of radius
11 Dorsal radiocarpal ligament
12 Radial collateral ligament
13 Articular capsule and dorsal intercarpal ligaments
14 Palmar radiocarpal ligament
15 Tendon of flexor carpi radialis muscle (cut)
16 Radiating carpal ligament
17 Palmar carpometacarpal ligaments
18 First metacarpal bone
19 Palmar ulnocarpal ligament
20 Tendon of flexor carpi ulnaris muscle (cut)
21 Pisohamate ligament
22 Pisometacarpal ligament
23 Palmar metacarpal ligaments
24 Fifth metacarpal bone
25 Articular disc (ulnocarpal)
26 Lunate bone
27 Triquetral bone
28 Hamate bone
29 Scaphoid bone (navicular)
30 Capitate bone
31 Trapezoid bone
32 Second and third metacarpal bones
33 Dorsal interosseus muscles

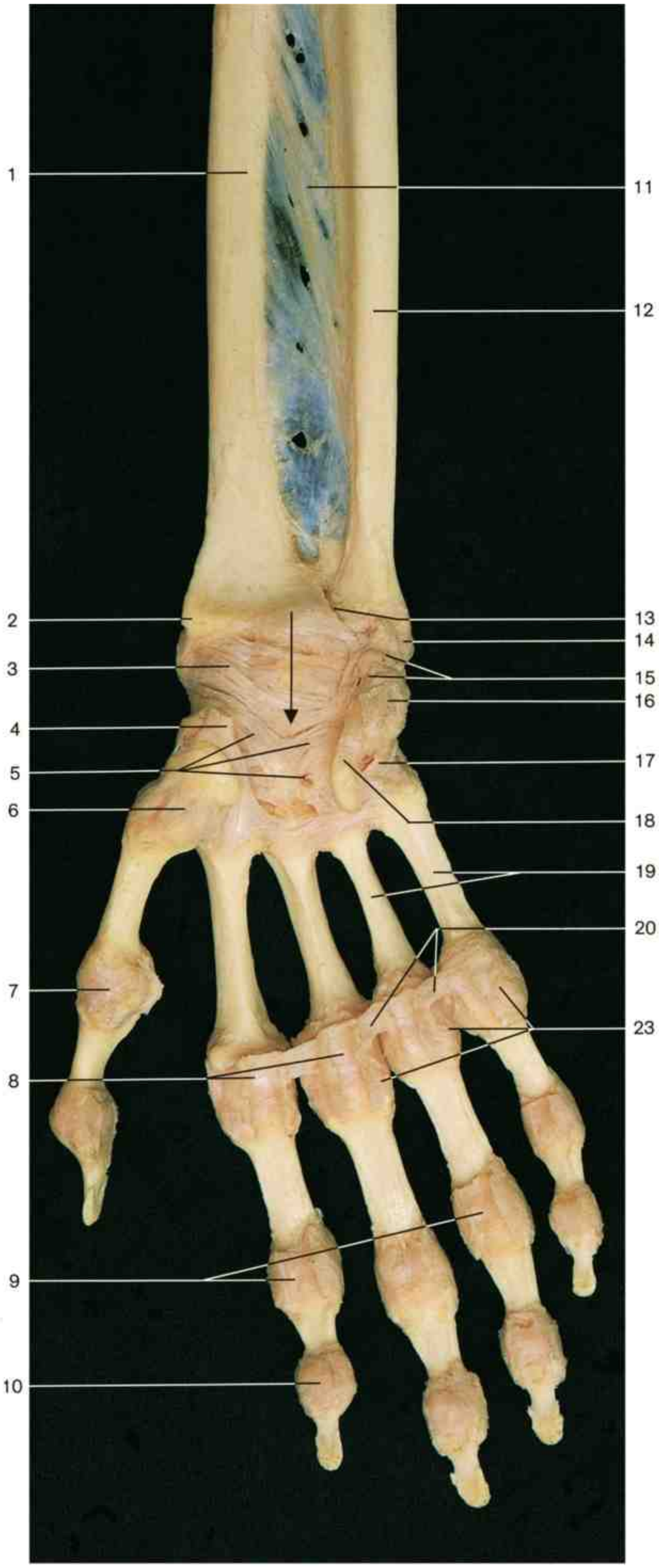


Ligaments of hand and wrist (palmar aspect).

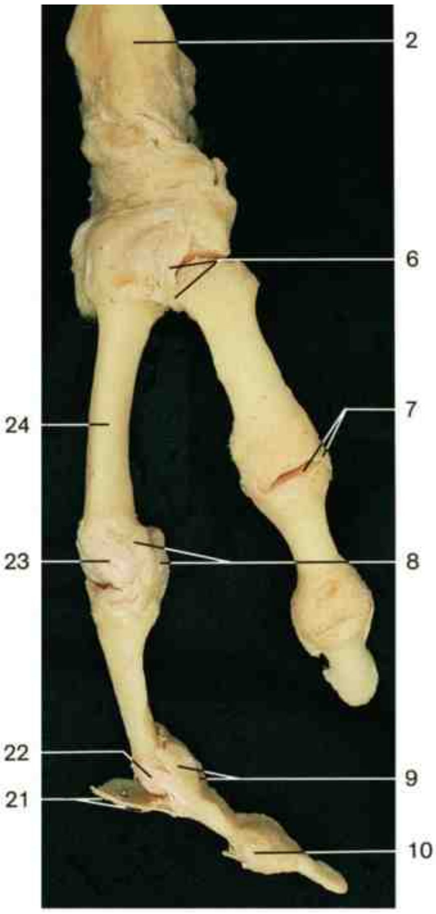


Coronal section of the hand and wrist (MRI scan; from Heuck et al., MRT-Atlas, 2009). Note the location of the wrist joint.

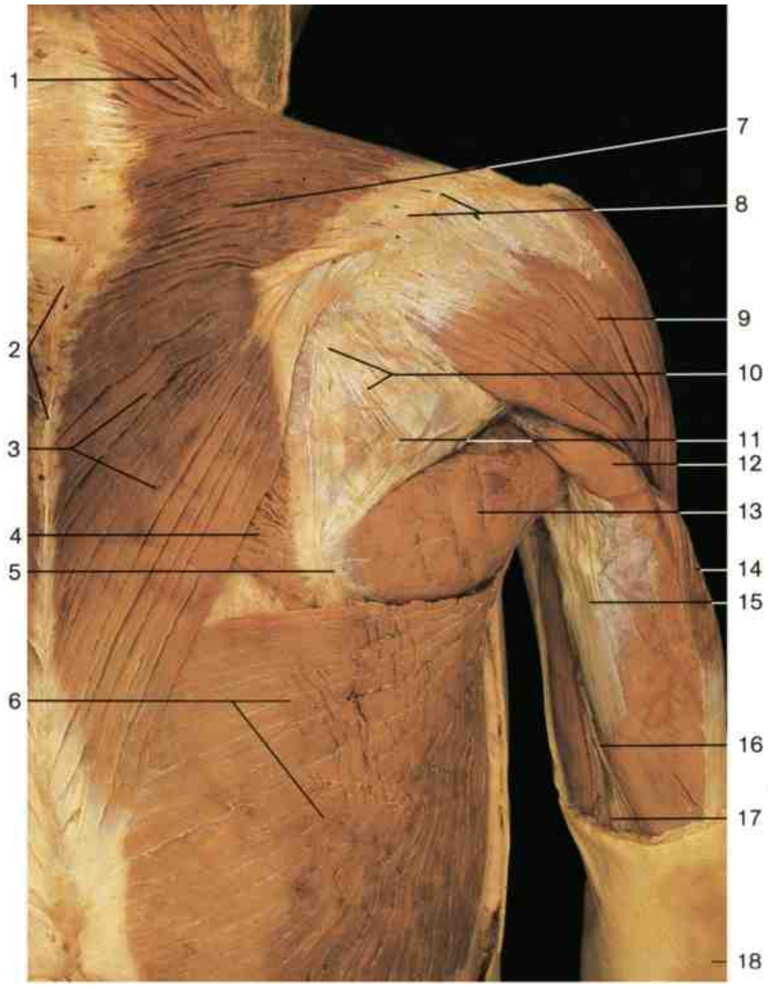
1	Radius
2	Styloid process of radius
3	Palmar radiocarpal ligament
4	Tendon of flexor carpi radialis muscle (cut)
5	Radiating carpal ligament
6	Articular capsule of carpometacarpal joint of thumb
7	Articular capsule of metacarpophalangeal joint of thumb
8	Palmar ligaments and articular capsule of metacarpophalangeal joints
9	Palmar ligaments and articular capsule of interphalangeal joints
10	Articular capsule
11	Interosseous membrane
12	Ulna
13	Distal radio-ulnar joint
14	Styloid process of ulna
15	Palmar ulnocarpal ligament
16	Pisiform bone with tendon of flexor carpi ulnaris muscle
17	Pisometacarpal ligament
18	Pisohamate ligament
19	Metacarpal bone
20	Deep transverse metacarpal ligament
21	Tendons of extensor muscles and articular capsule
22	Collateral ligament of interphalangeal joint
23	Collateral ligaments of metacarpophalangeal joints
24	Second metacarpal bone



Ligaments of right forearm, hand, and fingers (palmar aspect). The arrow indicates the location of the carpal tunnel.

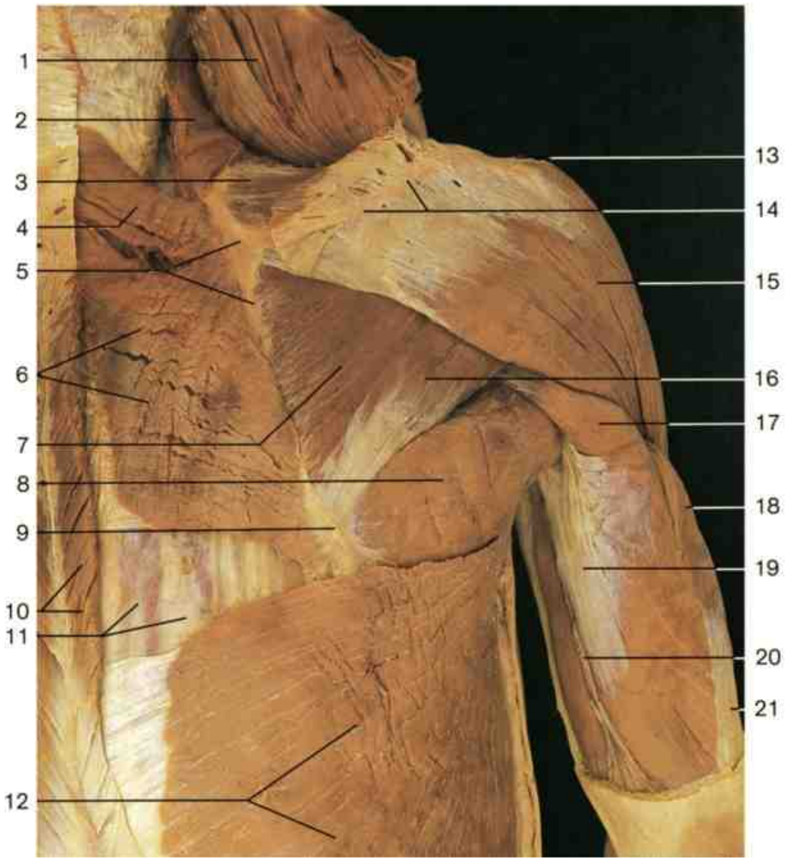


Ligaments of fingers (lateral aspect).



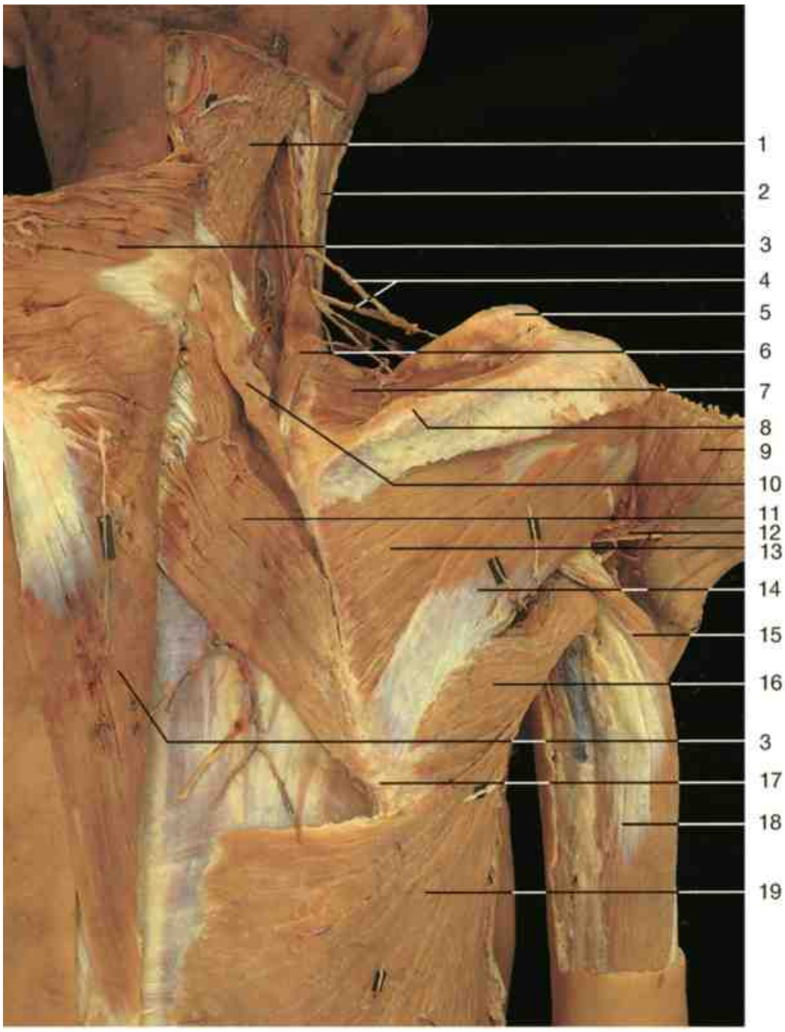
1 Descending fibers of trapezius muscle
2 Spinous processes of thoracic vertebrae
3 Ascending fibers of trapezius muscle
4 Rhomboid major muscle
5 Inferior angle of scapula
6 Latissimus dorsi muscle
7 Transverse fibers of trapezius muscle
8 Spine of scapula
9 Posterior fibers of deltoid muscle
10 Infraspinatus muscle and infraspinous fascia
11 Teres minor muscle and fascia
12 Long head of triceps brachii muscle
13 Teres major muscle
14 Lateral head of triceps brachii muscle
15 Medial head of triceps brachii muscle
16 Medial intermuscular septum
17 Ulnar nerve
18 Olecranon

Muscles of shoulder and arm, superficial layer (right side, dorsal aspect).



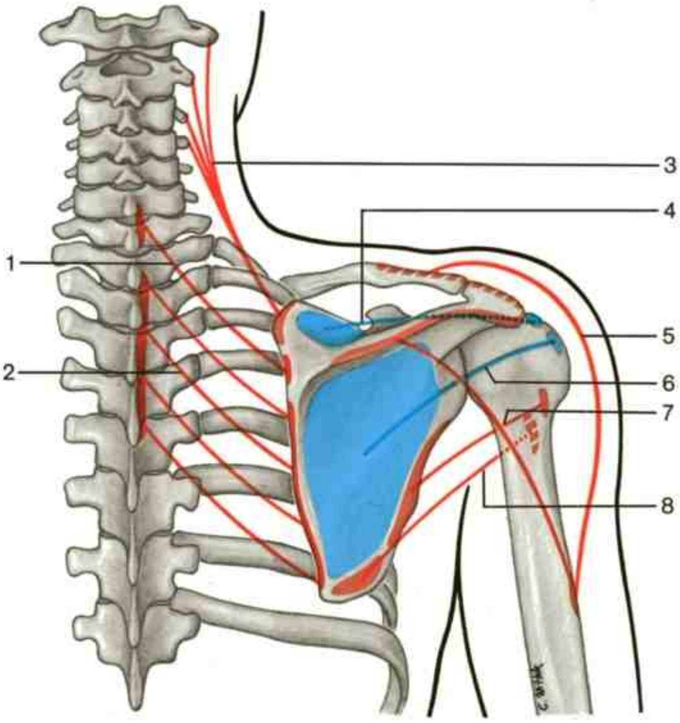
1 Trapezius muscle (reflected)
2 Levator scapulae muscle
3 Supraspinatus muscle
4 Rhomboid minor muscle
5 Medial border of scapula
6 Rhomboid major muscle
7 Infraspinatus muscle
8 Teres major muscle
9 Inferior angle of scapula
10 Cut edge of trapezius muscle
11 Intrinsic muscles of back with fascia
12 Latissimus dorsi muscle
13 Acromion
14 Spine of scapula
15 Deltoid muscle
16 Teres minor muscle
17 Long head of triceps brachii muscle
18 Lateral head of triceps brachii muscle
19 Medial head of triceps brachii muscle
20 Medial intermuscular septum
21 Tendon of triceps brachii muscle

Muscles of shoulder and arm, deeper layer (right side, dorsal aspect). The trapezius muscle has been cut near its origin at the vertebral column and reflected upward.



Muscles of shoulder and arm, deeper layer (right side, dorsal aspect). The trapezius and deltoid muscles have been divided and reflected.

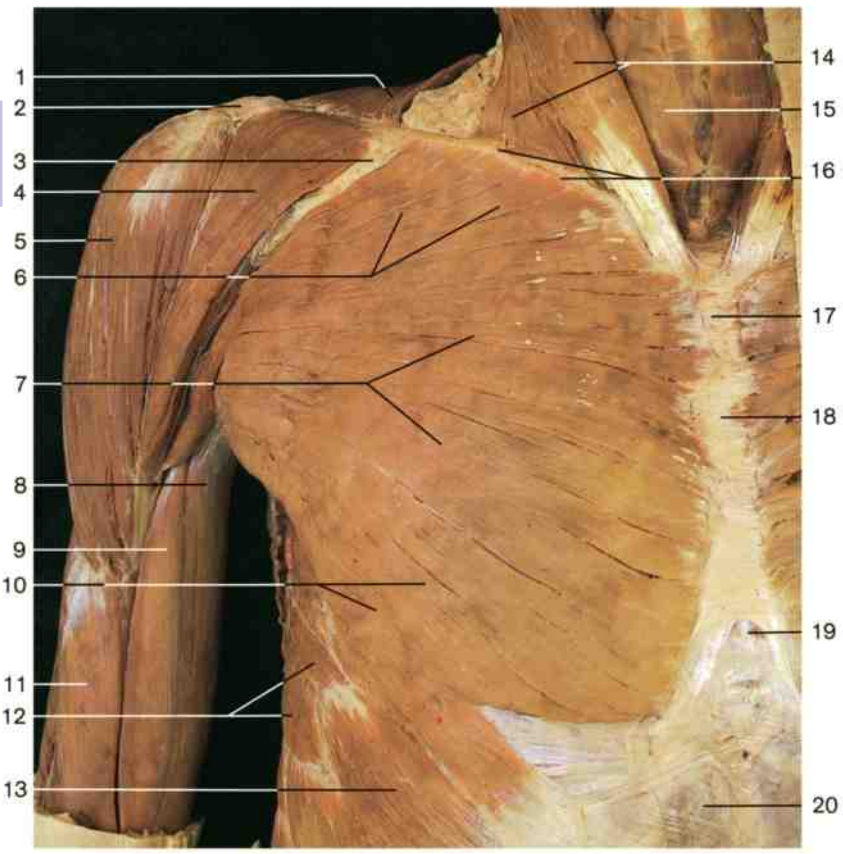
1 Splenius capitis muscle
2 Sternocleidomastoid muscle
3 Trapezius muscle (reflected)
4 Lateral supraclavicular nerves
5 Clavicle
6 Levator scapulae muscle
7 Supraspinatus muscle
8 Spine of scapula
9 Deltoid muscle (reflected)
10 Rhomboid minor muscle
11 Rhomboid major muscle
12 Axillary nerve and posterior circumflex humeral artery
13 Infraspinatus muscle
14 Teres minor muscle
15 Long head of triceps brachii muscle
16 Teres major muscle
17 Inferior angle of scapula
18 Triceps brachii muscle
19 Latissimus dorsi muscle



Shoulder muscles, schematic diagram illustrating the course of the main muscles of the dorsal aspect of the shoulder.

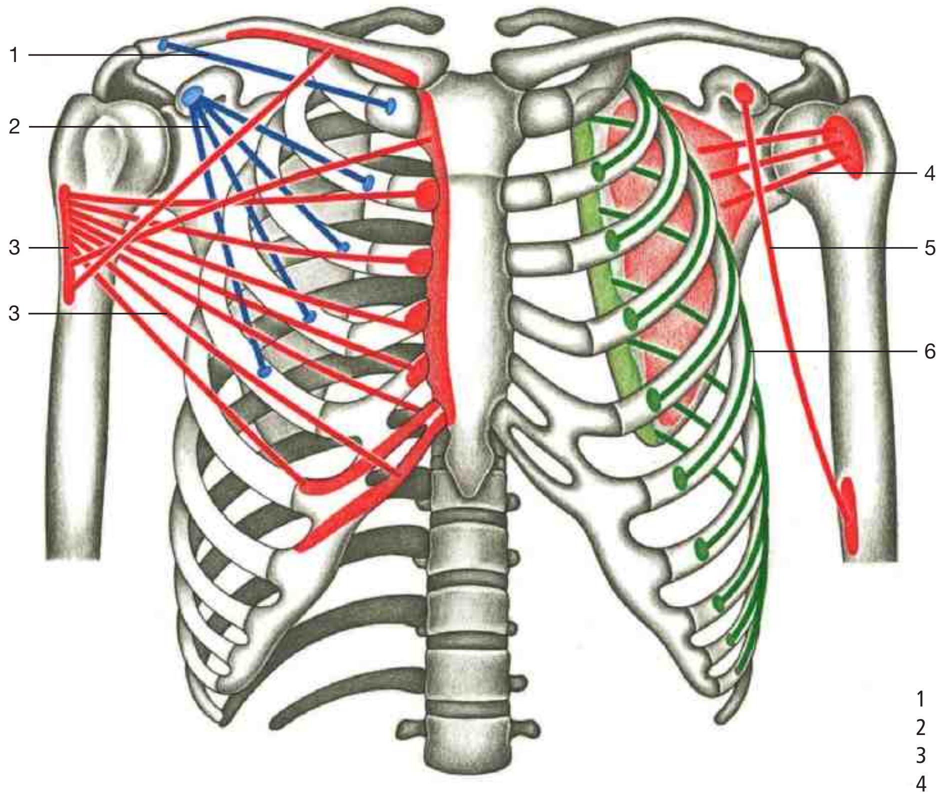
◁

1 Rhomboid minor muscle (red)
2 Rhomboid major muscle (red)
3 Levator scapulae muscle (red)
4 Supraspinatus muscle (blue)
5 Deltoid muscle (red)
6 Infraspinatus muscle (blue)
7 Teres minor muscle (red)
8 Teres major muscle (red)



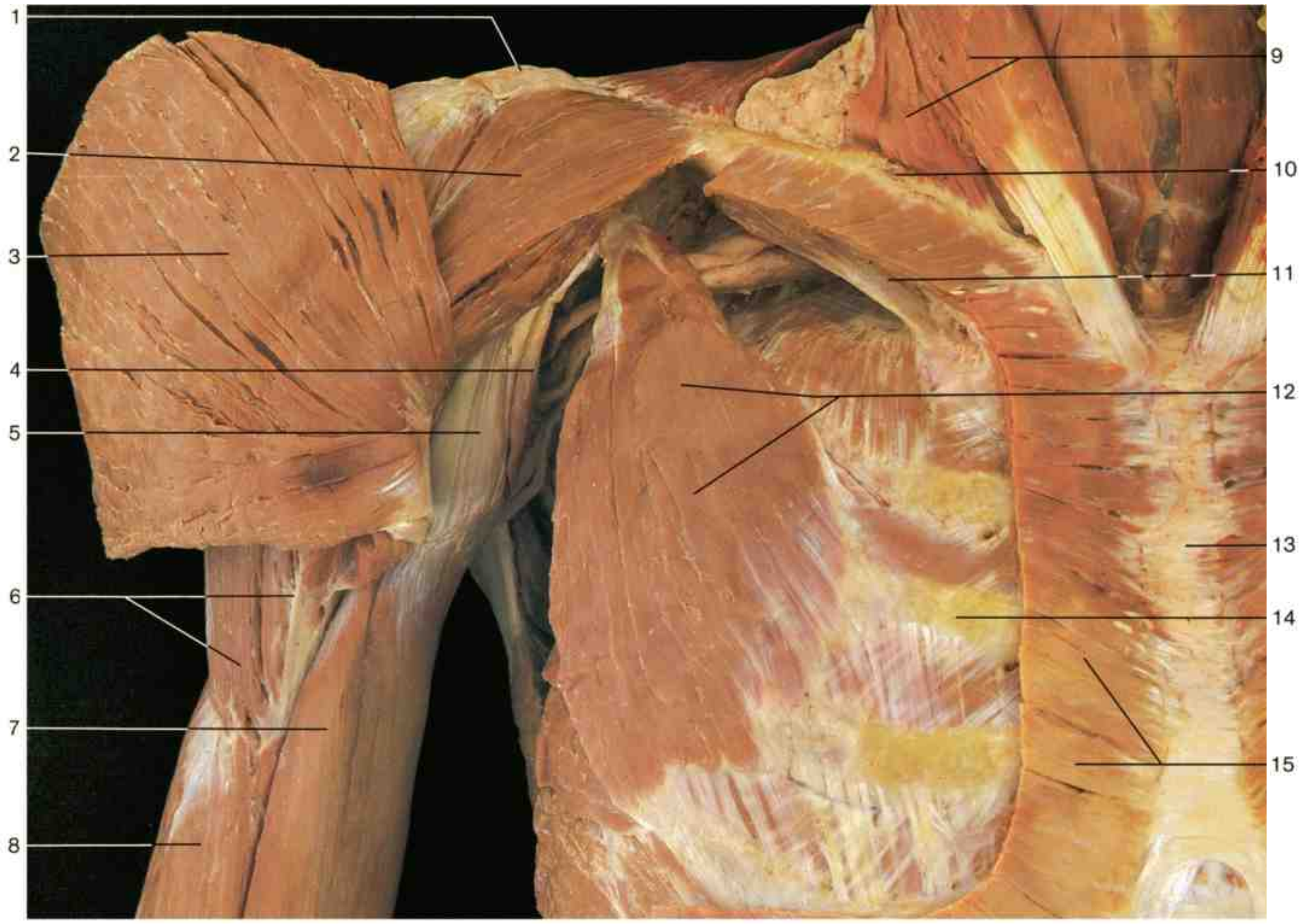
1 Trapezius muscle
2 Acromion
3 Deltopectoral triangle
4 Clavicular part of deltoid muscle (anterior fibers)
5 Acromial part of deltoid muscle (central fibers)
6 Clavicular part of pectoralis major muscle
7 Sternocostal part of pectoralis major muscle
8 Short head of biceps brachii muscle
9 Long head of biceps brachii muscle
10 Abdominal part of pectoralis major muscle
11 Brachialis muscle
12 Serratus anterior muscle
13 External abdominal oblique muscle
14 Sternocleidomastoid muscle
15 Infrahyoid muscles
16 Clavicle
17 Manubrium sterni
18 Body of sternum
19 Xiphoid process
20 Anterior layer of sheath of rectus abdominis muscle

Shoulder, arm, and pectoral muscles, superficial layer (ventral aspect).

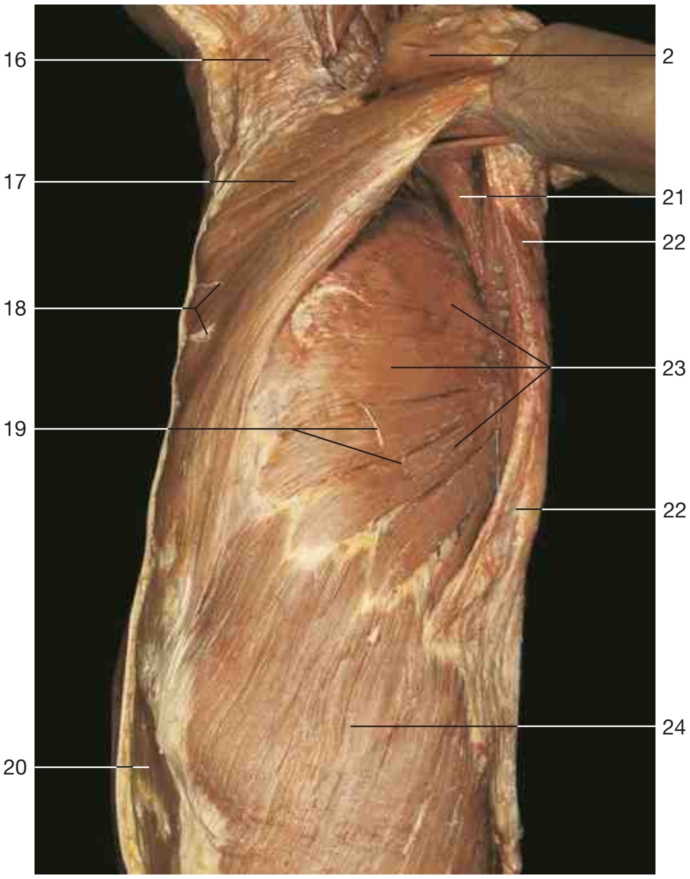


Arrangement of pectoral and shoulder muscles (ventral aspect). (Schematic drawing.)

1 Subclavius muscle (blue)
2 Pectoralis minor muscle (blue)
3 Pectoralis major muscle (red)
4 Subscapularis muscle (red)
5 Coracobrachialis muscle (red)
6 Serratus anterior muscle (green)

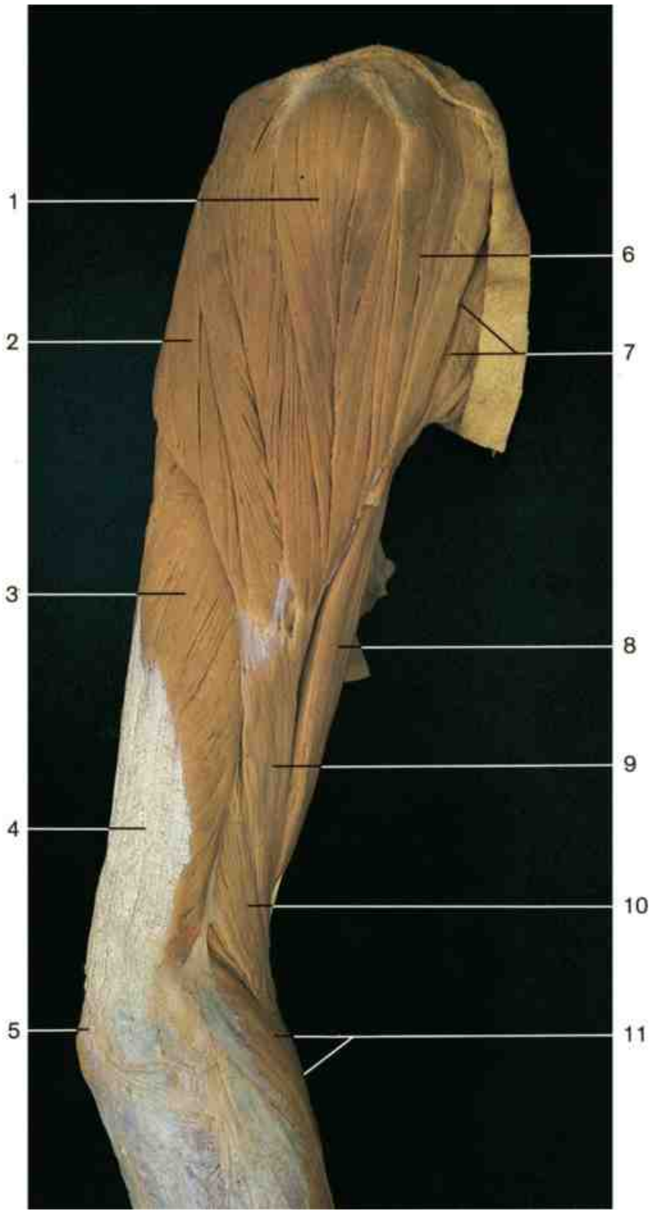


Shoulder, arm, and pectoral muscles, deep layer (ventral aspect).



1	Acromion
2	Clavicular part of deltoid muscle
3	Pectoralis major muscle (reflected)
4	Coracobrachialis muscle
5	Short head of biceps brachii muscle
6	Deltoid muscle (insertion on humerus)
7	Long head of biceps brachii muscle
8	Brachialis muscle
9	Sternocleidomastoid muscle
10	Clavicle
11	Subclavius muscle
12	Pectoralis minor muscle
13	Sternum
14	Third rib
15	Pectoralis major muscle
16	Platysma muscle
17	Pectoralis major muscle forming the anterior axillary fold
18	Anterior cutaneous branches of intercostal nerves
19	Lateral cutaneous branches of intercostal nerves
20	Rectus abdominis muscle
21	Subscapularis muscle
22	Latissimus dorsi muscle forming the posterior axillary fold
23	Serratus anterior muscle forming the medial wall of the axilla
24	External abdominal oblique muscle

Axillary fossa and serratus anterior muscle
(left side, lateral aspect).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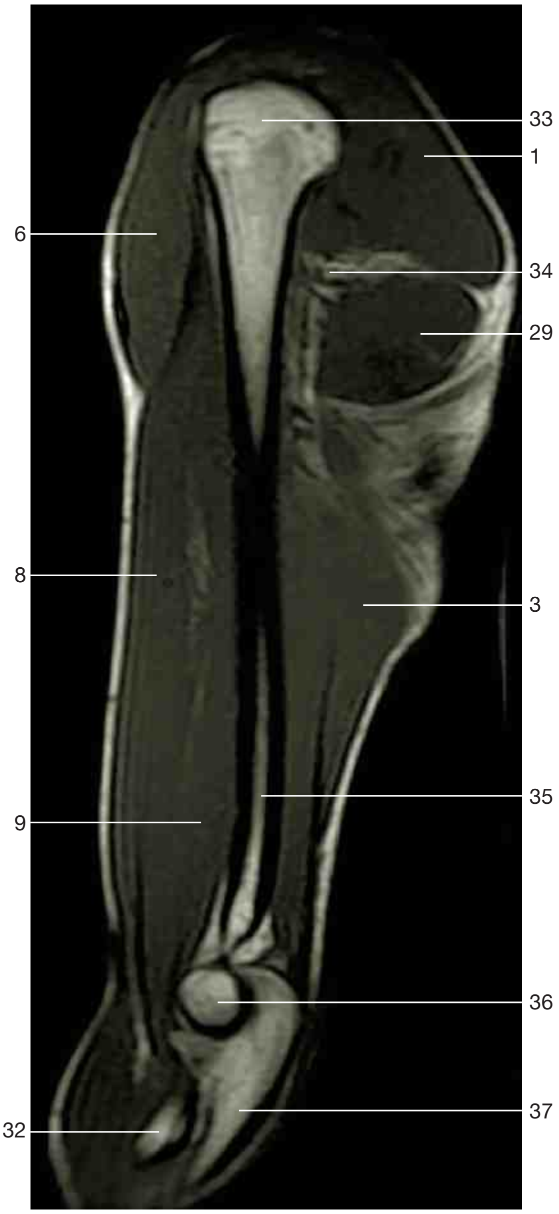
Muscles of the right arm (lateral aspect).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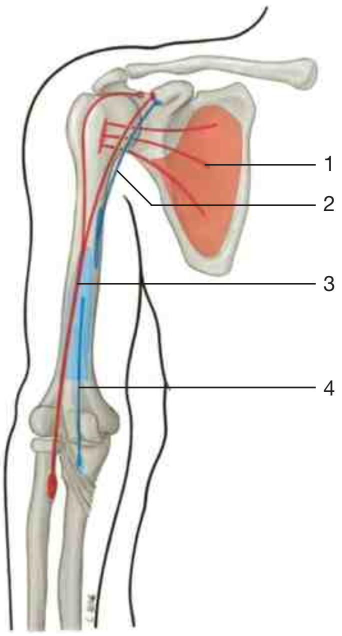
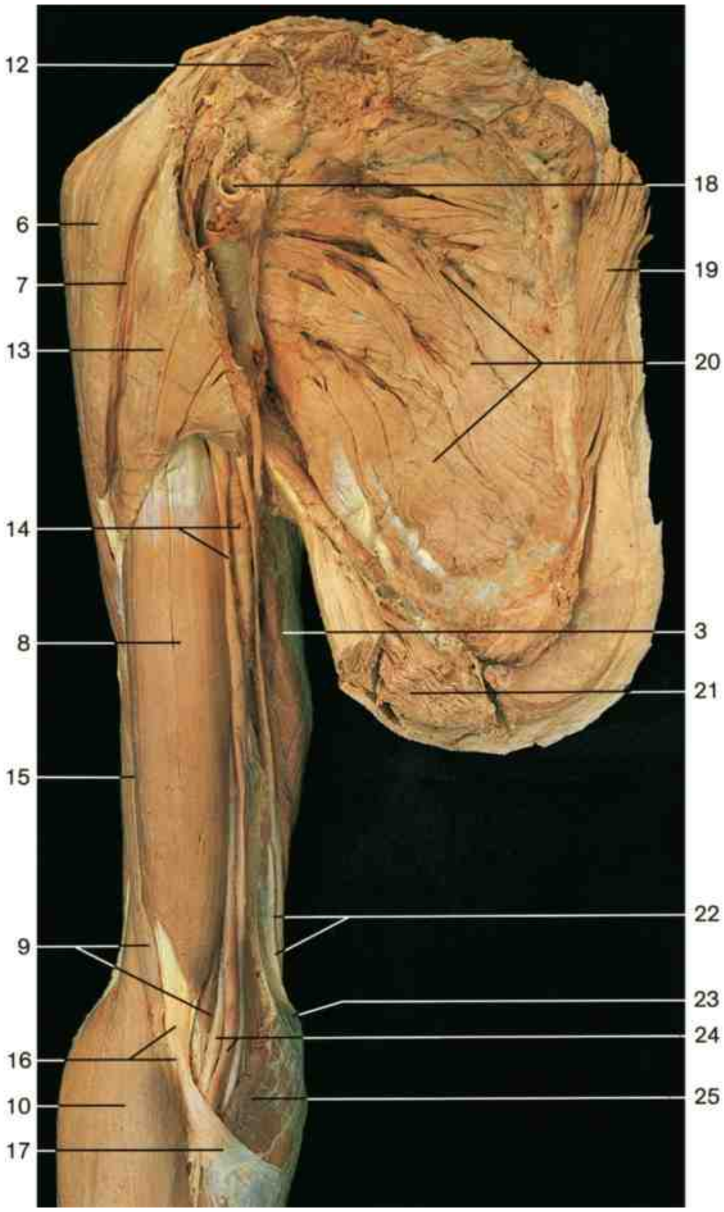
Sagittal section of the right arm (MRI scan; from Heuck et al., MRT-Atlas, 2009).

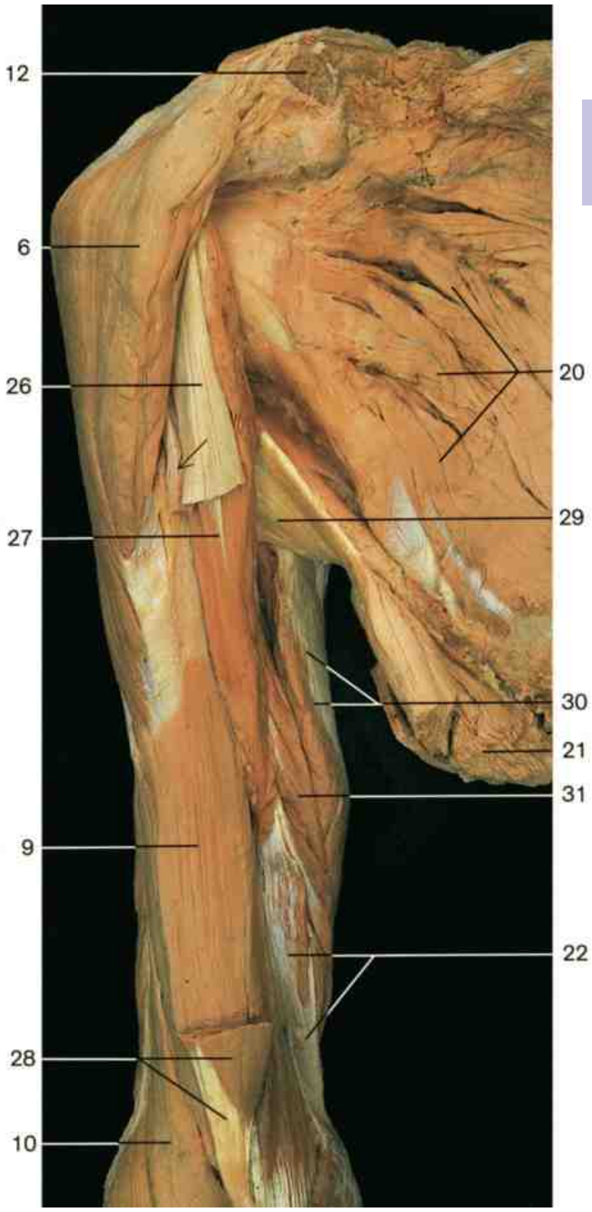


Position and course of flexors of arm (schematic drawing).

1 Subscapularis muscle (red)
2 Coracobrachialis muscle (blue)
3 Biceps brachii muscle (red)
4 Brachialis muscle (blue)

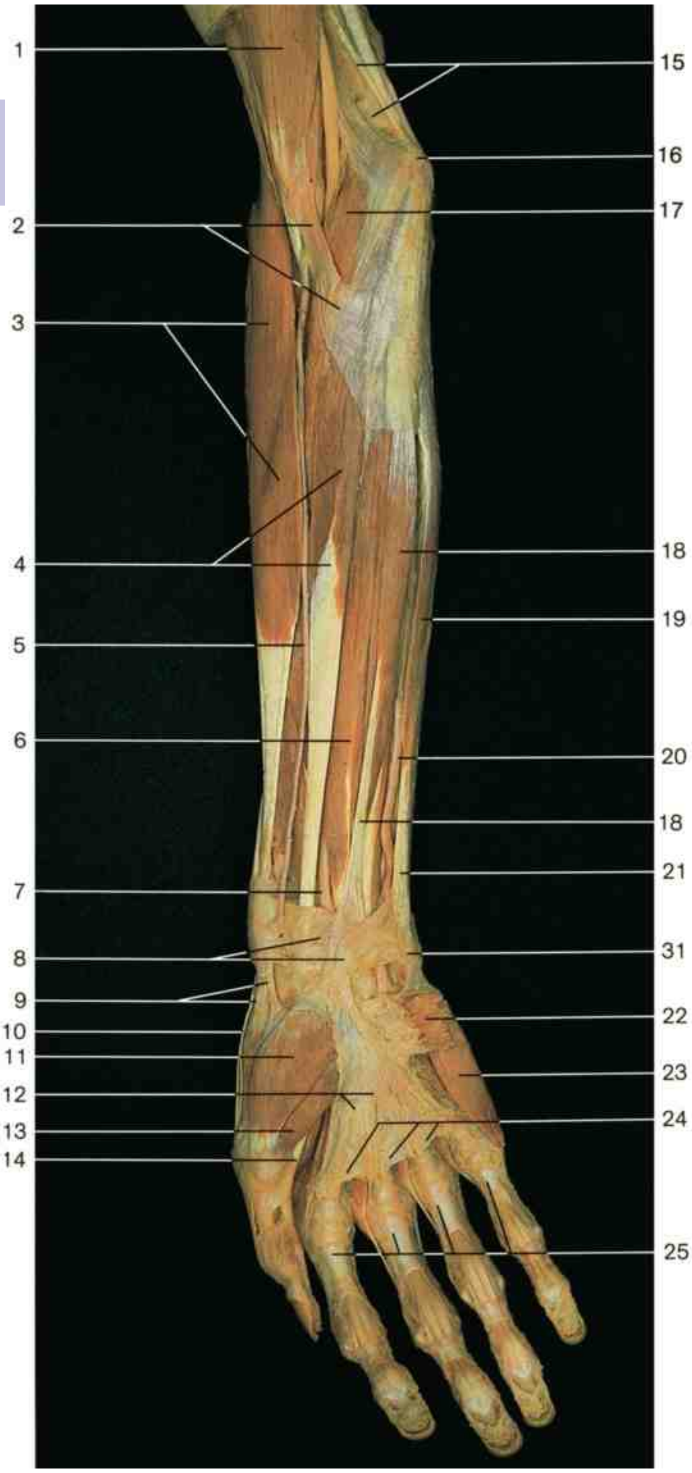


Muscles of the right arm (ventral aspect). The arm with the scapula and attached muscles has been removed from the trunk.

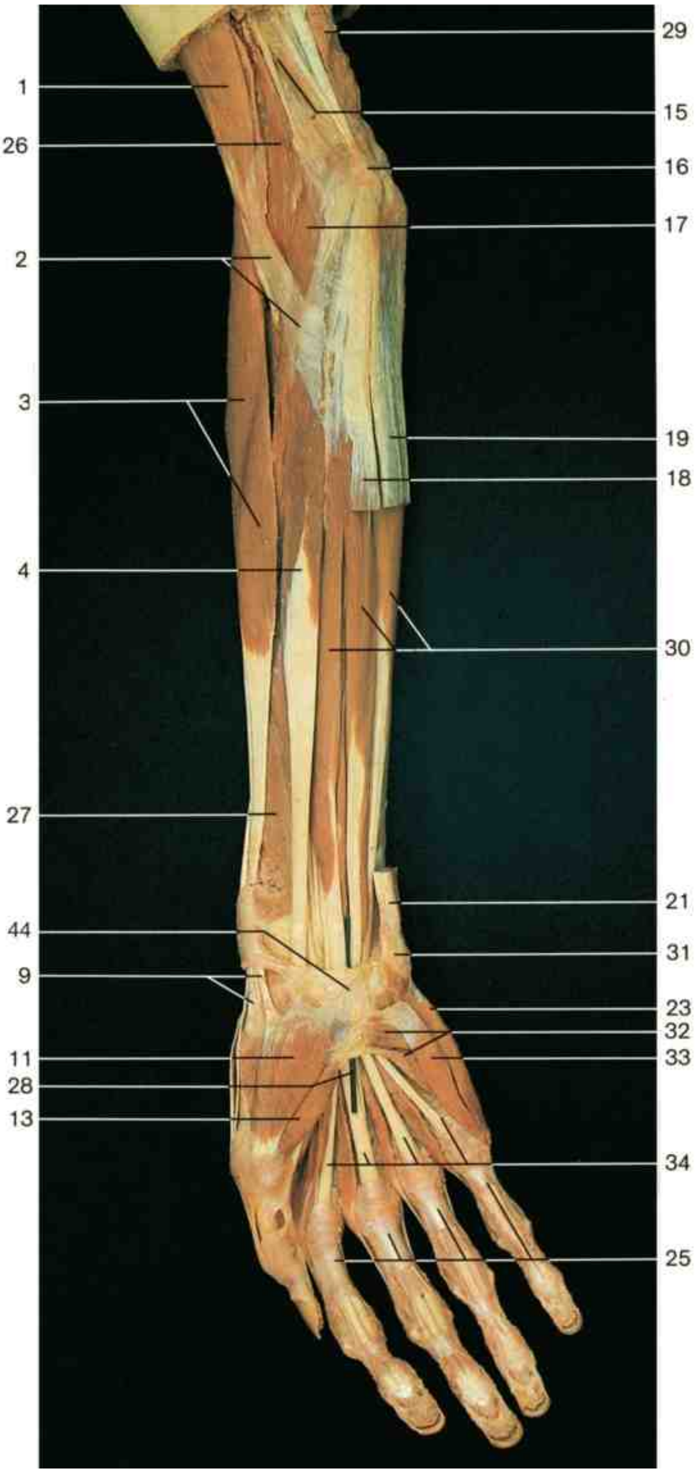


Muscles of the right arm (ventral aspect). Part of the biceps brachii muscle has been removed. Arrow: tendon of long head of biceps brachii muscle.

1 Acromial part of deltoid muscle (central fibers)
2 Scapular part of deltoid muscle (posterior fibers)
3 Triceps brachii muscle
4 Tendon of triceps brachii muscle
5 Olecranon
6 Clavicular part of deltoid muscle (anterior fibers)
7 Deltopectoral groove
8 Biceps brachii muscle
9 Brachialis muscle
10 Brachioradialis muscle
11 Extensor carpi radialis longus muscle
12 Clavicle (divided)
13 Pectoralis major muscle
14 Medial intermuscular septum with vessels and nerves
15 Lateral intermuscular septum
16 Tendon of biceps brachii muscle
17 Bicipital aponeurosis
18 Axillary artery
19 Rhomboid major muscle
20 Subscapularis muscle
21 Latissimus dorsi muscle (divided)
22 Medial intermuscular septum
23 Medial epicondyle of humerus
24 Brachial artery and median nerve
25 Pronator teres muscle
26 Tendon of short head of biceps brachii muscle
27 Coracobrachialis muscle
28 Distal part of biceps brachii muscle
29 Teres major muscle
30 Long head of triceps brachii muscle
31 Medial head of triceps brachii muscle
32 Radius
33 Head of humerus
34 Axillary nerve
35 Humerus
36 Trochlea
37 Ulna

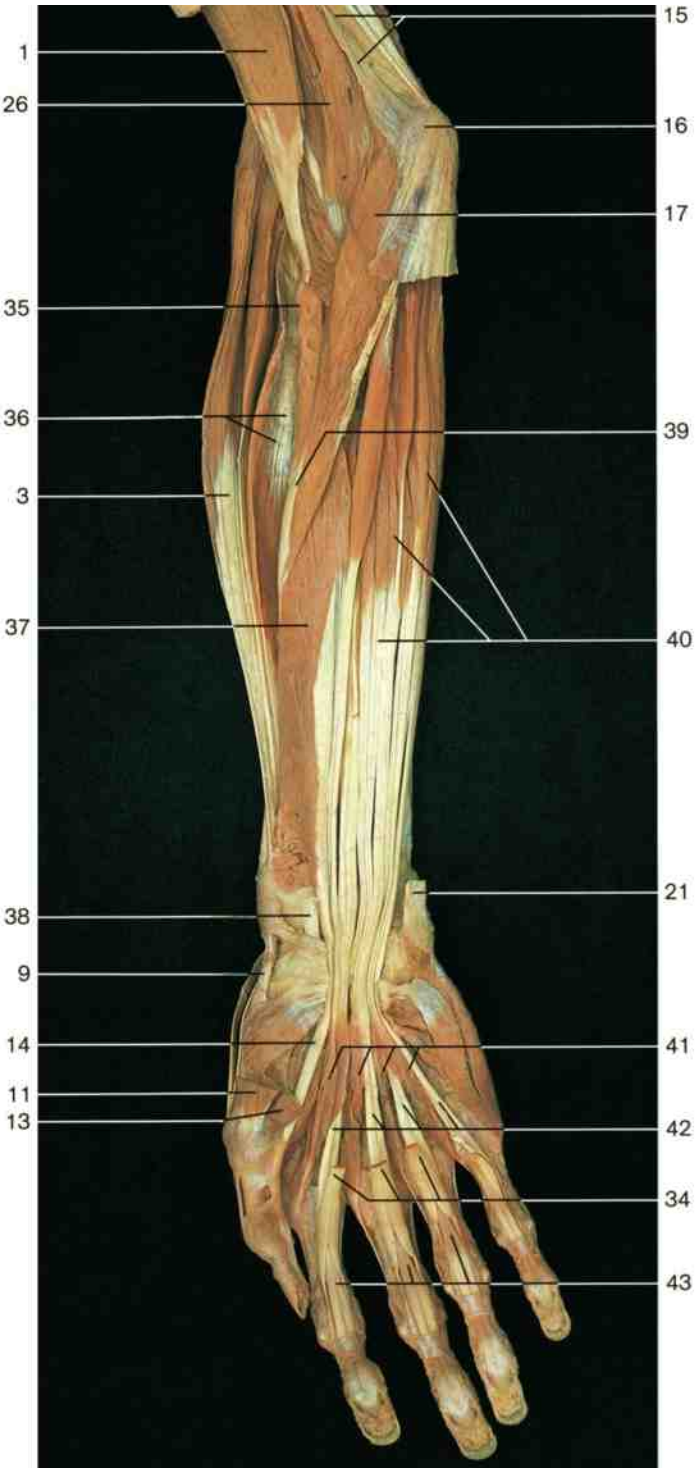


Flexor muscles of forearm and hand, superficial layer (ventral aspect).

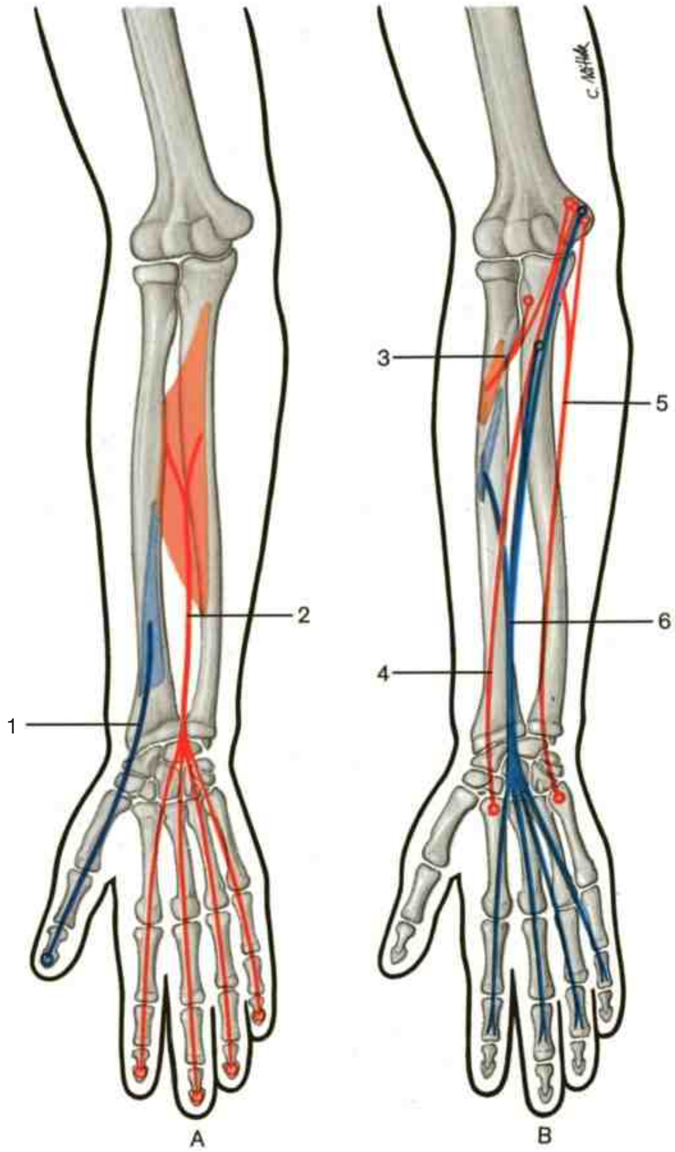


Flexor muscles of forearm and hand, superficial layer (ventral aspect). The palmaris longus and flexor carpi ulnaris muscles have been removed.

1 Biceps brachii muscle
2 Bicipital aponeurosis
3 Brachioradialis muscle
4 Flexor carpi radialis muscle
5 Radial artery
6 Flexor digitorum superficialis muscle
7 Median nerve
8 Antebrachial fascia and tendon of palmaris longus muscle
9 Tendon of abductor pollicis longus muscle
10 Tendon of extensor pollicis brevis muscle
11 Abductor pollicis brevis muscle
12 Palmar aponeurosis
13 Superficial head of flexor pollicis brevis muscle
14 Tendon of flexor pollicis longus muscle
15 Medial intermuscular septum
16 Medial epicondyle of humerus
17 Humeral head of pronator teres muscle
18 Palmaris longus muscle
19 Flexor carpi ulnaris muscle
20 Ulnar artery
21 Tendon of flexor carpi ulnaris muscle
22 Palmaris brevis muscle



Flexor muscles of forearm and hand, middle layer (ventral aspect). The palmaris longus, flexor carpi radialis, and ulnaris muscles have been removed. The flexor retinaculum has been divided.



Position of flexors of fingers and hand (schematic drawing).

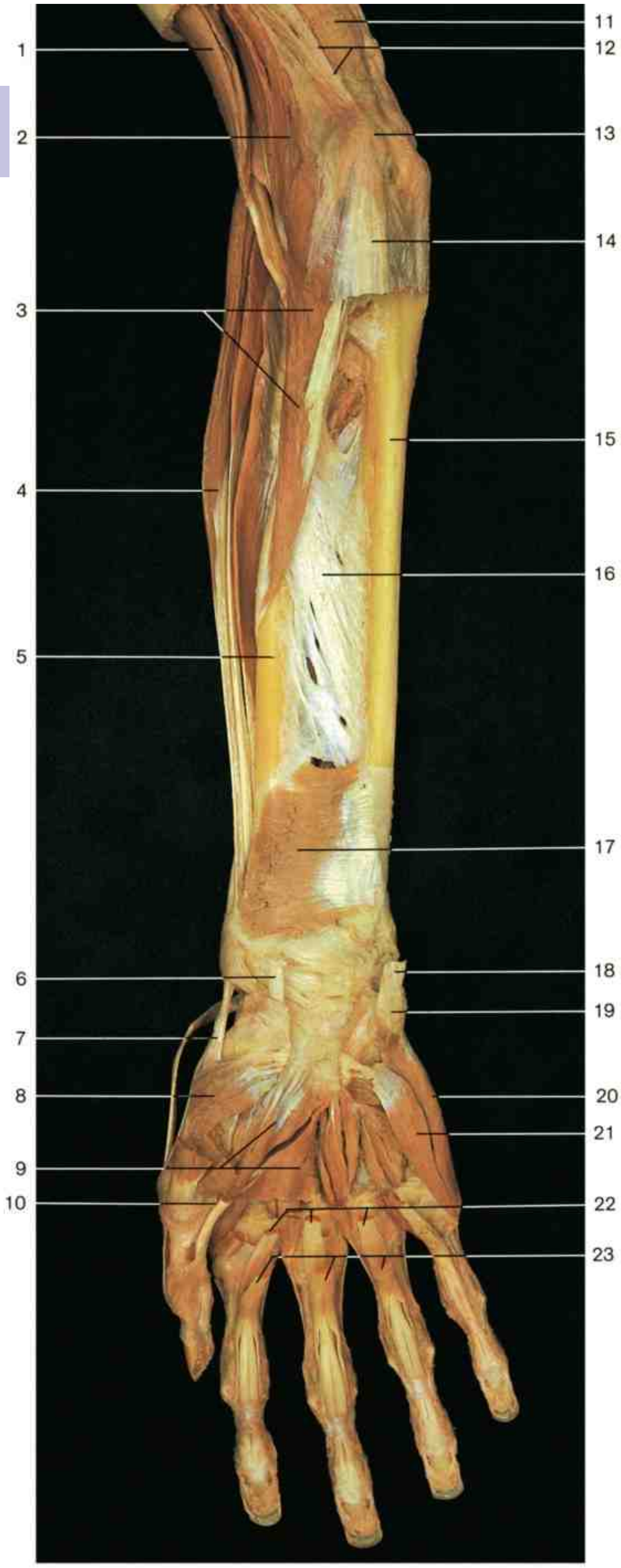
A Deep layer

1 Flexor pollicis longus muscle (blue)
2 Flexor digitorum profundus muscle (red)

B Superficial layer

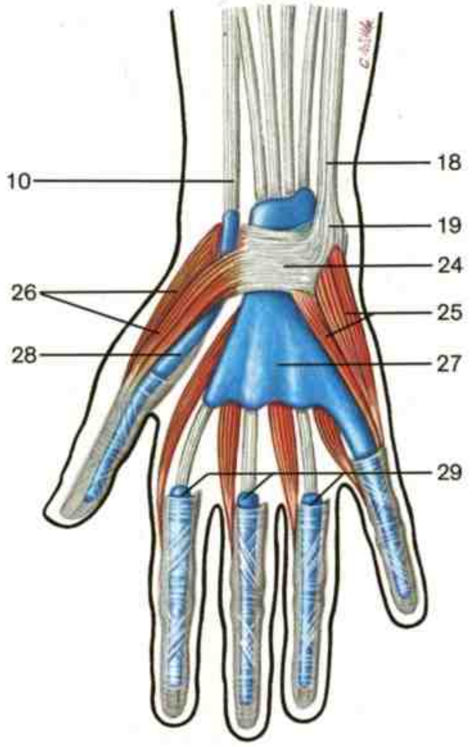
3 Pronator teres muscle (red)
4 Flexor carpi radialis muscle (red)
5 Flexor carpi ulnaris muscle (red)
6 Flexor digitorum superficialis muscle (blue)

23 Abductor digiti minimi muscle
24 Transverse fasciculi of palmar aponeurosis
25 Digital fibrous sheaths of tendons of flexor digitorum muscle
26 Brachialis muscle
27 Flexor pollicis longus muscle
28 Carpal tunnel (canalis carpi, probe)
29 Triceps brachii muscle
30 Flexor digitorum superficialis muscle
31 Pisiform bone
32 Opponens digiti minimi muscle
33 Flexor digiti minimi brevis muscle
34 Tendons of flexor digitorum superficialis muscle
35 Supinator muscle
36 Extensor carpi radialis brevis muscle
37 Flexor pollicis longus muscle
38 Tendon of flexor carpi radialis muscle
39 Pronator teres muscle (insertion of radius)
40 Flexor digitorum profundus muscle
41 Lumbrical muscles
42 Tendons of flexor digitorum profundus muscle
43 Tendons of flexor digitorum profundus muscle having passed through the divided tendons of the flexor digitorum superficialis muscle
44 Flexor retinaculum



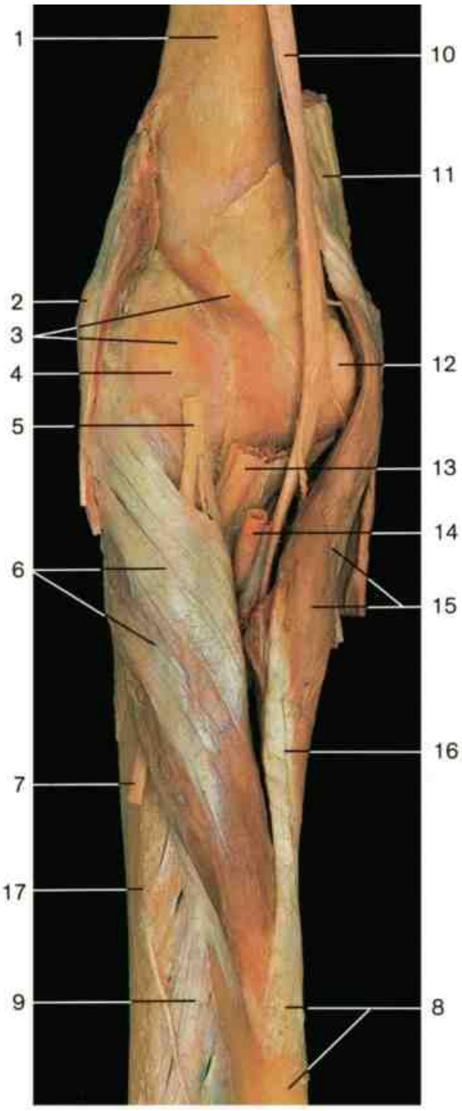
Flexor muscles of forearm and hand, deep layer (ventral aspect). All flexors have been removed to display the pronator quadratus and pronator teres muscles together with the interosseous membrane. Forearm in supination.

1. Biceps brachii muscle
2. Brachialis muscle
3. Pronator teres muscle
4. Brachioradialis muscle
5. Radius
6. Tendon of flexor carpi radialis muscle
7. Tendon of abductor pollicis longus muscle
8. Opponens pollicis muscle
9. Adductor pollicis muscle
10. Tendon of flexor pollicis longus muscle
11. Triceps brachii muscle
12. Medial intermuscular septum
13. Medial epicondyle of humerus
14. Common flexor mass (divided)
15. Ulna
16. Interosseous membrane
17. Pronator quadratus muscle
18. Tendon of flexor carpi ulnaris muscle
19. Pisiform bone
20. Abductor digiti minimi muscle
21. Flexor digiti minimi brevis muscle
22. Tendons of flexor digitorum profundus muscle
23. Tendons of flexor digitorum superficialis muscle
24. Flexor retinaculum
25. Hypothenar muscles
26. Thenar muscles
27. Common synovial sheath of flexor tendons
28. Synovial sheath of tendon of flexor pollicis longus muscle
29. Digital synovial sheaths of flexor tendons

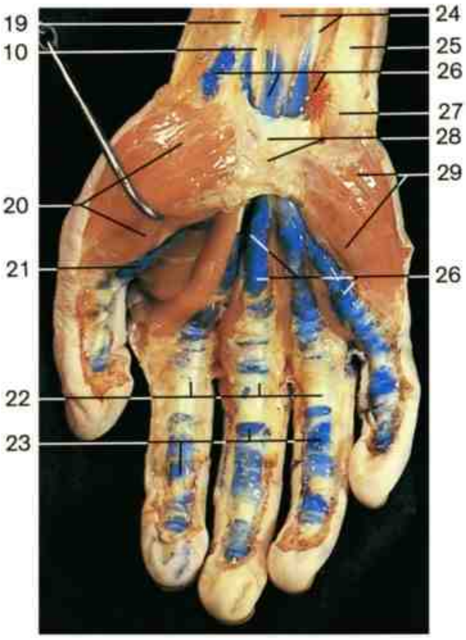


Synovial sheaths of flexor tendons (palmar aspect of right hand, semischematic drawing).

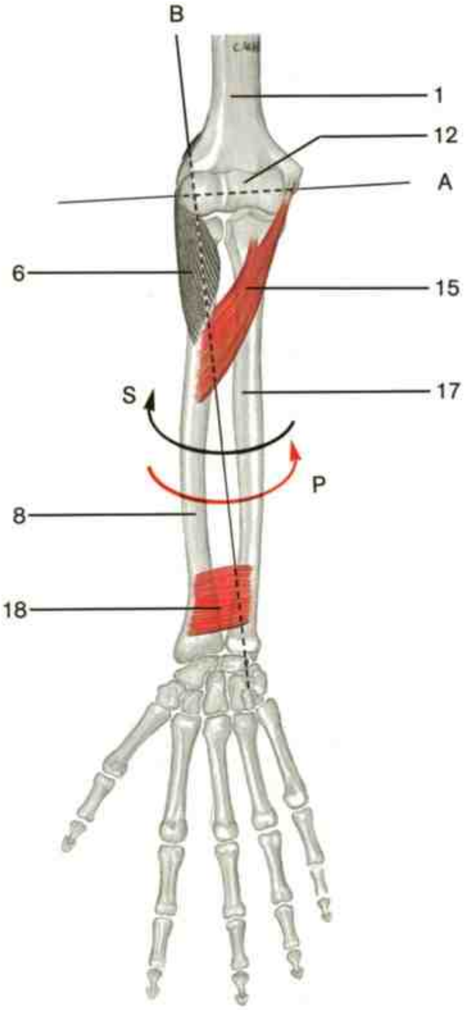
1 Humerus
2 Lateral epicondyle of humerus
3 Articular capsule
4 Position of capitulum of humerus
5 Deep branch of radial nerve
6 Supinator muscle
7 Entrance of deep branch of radial nerve to extensor muscles
8 Radius and insertion of pronator teres muscle
9 Interosseous membrane
10 Median nerve
11 Triceps brachii muscle
12 Trochlea of humerus
13 Tendon of biceps brachii muscle
14 Brachial artery
15 Pronator teres muscle
16 Tendon of pronator teres muscle
17 Ulna
18 Pronator quadratus muscle
19 Tendon of flexor carpi radialis muscle
20 Thenar muscles
21 Synovial sheath of tendon of flexor pollicis longus muscle
22 Fibrous sheath of flexor tendons
23 Digital synovial sheath of flexor tendons
24 Flexor digitorum superficialis muscle
25 Tendon of flexor carpi ulnaris muscle
26 Common synovial sheath of flexor tendons
27 Position of pisiform bone
28 Flexor retinaculum
29 Hypothenar muscles



Right supinator and elbow joint (ventral aspect). Forearm in pronation.



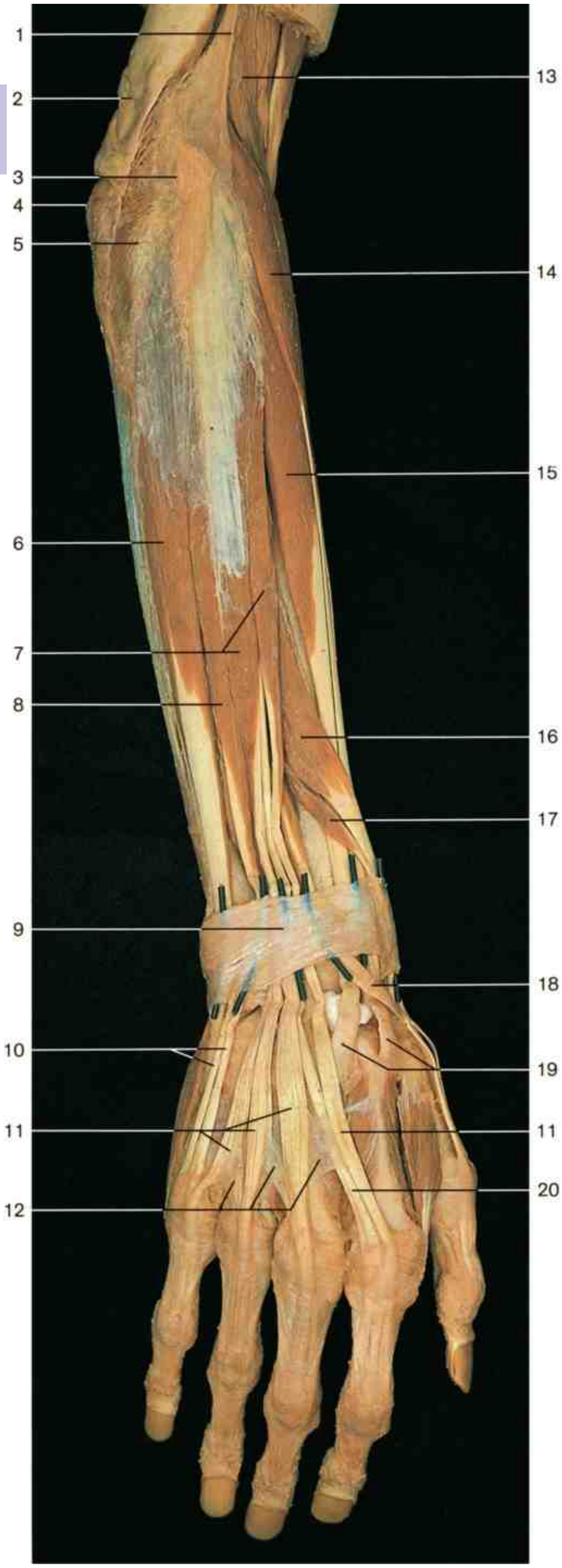
Synovial sheaths of flexor tendons (palmar aspect of right hand). Blue PVA solution has been injected into the sheaths.



A = axis of flexion and extension
B = axis of rotation

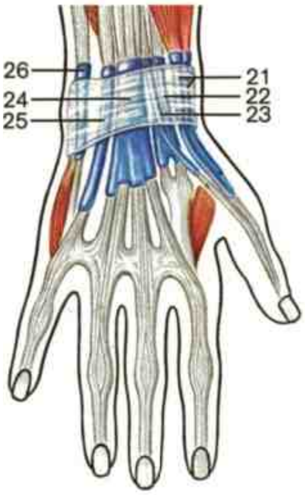
Arrows:
S = supination
P = pronation

Diagram illustrating the two axes of the elbow joint.

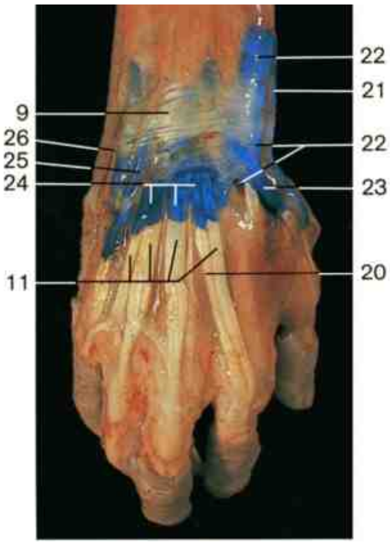


Extensor muscles of forearm and hand, superficial layer (dorsal aspect). Tunnels for extensor tendons indicated by probes.

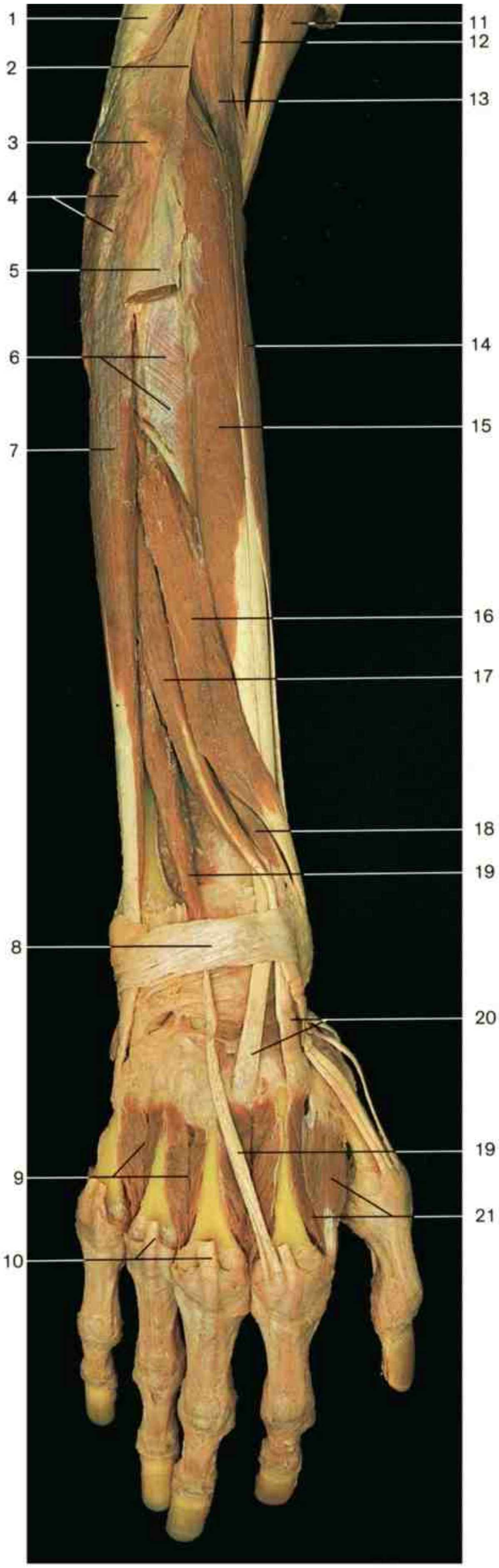
1 Lateral intermuscular septum
2 Tendon of triceps brachii muscle
3 Lateral epicondyle of humerus
4 Olecranon
5 Anconeus muscle
6 Extensor carpi ulnaris muscle
7 Extensor digitorum muscle
8 Extensor digiti minimi muscle
9 Extensor retinaculum
10 Tendons of extensor digiti minimi muscle
11 Tendons of extensor digitorum muscle
12 Intertendinous connections
13 Brachioradialis muscle
14 Extensor carpi radialis longus muscle
15 Extensor carpi radialis brevis muscle
16 Abductor pollicis longus muscle
17 Extensor pollicis brevis muscle
18 Tendon of extensor pollicis longus muscle
19 Tendons of both extensor carpi radialis longus and extensor carpi radialis brevis muscles
20 Tendon of extensor indicis muscle
21 First tunnel: Abductor pollicis longus muscle, extensor pollicis brevis muscle
22 Second tunnel: Extensor carpi radialis longus and brevis muscles
23 Third tunnel: Extensor pollicis longus muscle
24 Fourth tunnel: Extensor digitorum muscle, extensor indicis muscle
25 Fifth tunnel: Extensor digiti minimi muscle
26 Sixth tunnel: Extensor carpi ulnaris muscle



Synovial sheaths of extensor tendons on the back of the right wrist (indicated in blue). Notice the six tunnels for the passage of the extensor tendons beneath the extensor retinaculum (schematic drawing).

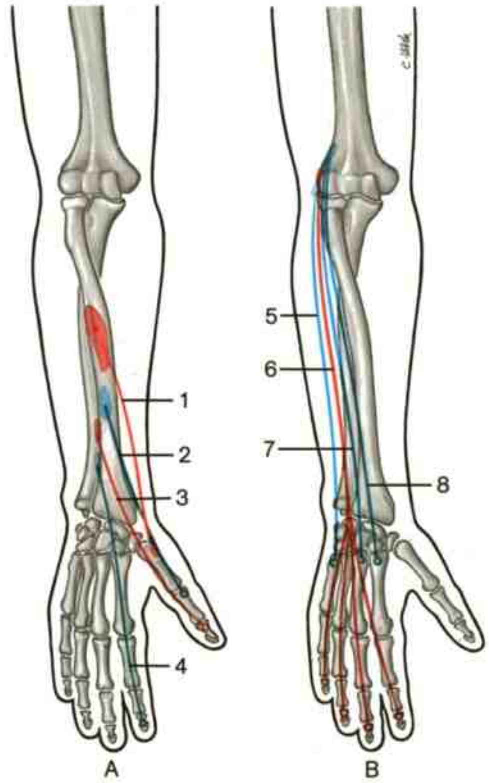


Synovial sheaths of extensor tendons. The sheaths have been injected with blue gelatin.



Extensor muscles of forearm and hand, deep layer (dorsal aspect).

1 Triceps brachii muscle
2 Lateral intermuscular septum
3 Lateral epicondyle of humerus
4 Anconeus muscle
5 Extensor digitorum and extensor digiti minimi muscles (cut)
6 Supinator muscle
7 Extensor carpi ulnaris muscle
8 Extensor retinaculum
9 Third and fourth dorsal interosseous muscles
10 Tendons of extensor digitorum muscle (cut)
11 Biceps brachii muscle
12 Brachialis muscle
13 Brachioradialis muscle
14 Extensor carpi radialis longus muscle
15 Extensor carpi radialis brevis muscle
16 Abductor pollicis longus muscle
17 Extensor pollicis longus muscle
18 Extensor pollicis brevis muscle
19 Extensor indicis muscle
20 Tendons of the extensor carpi radialis longus and extensor carpi radialis brevis muscles
21 First dorsal interosseous muscle



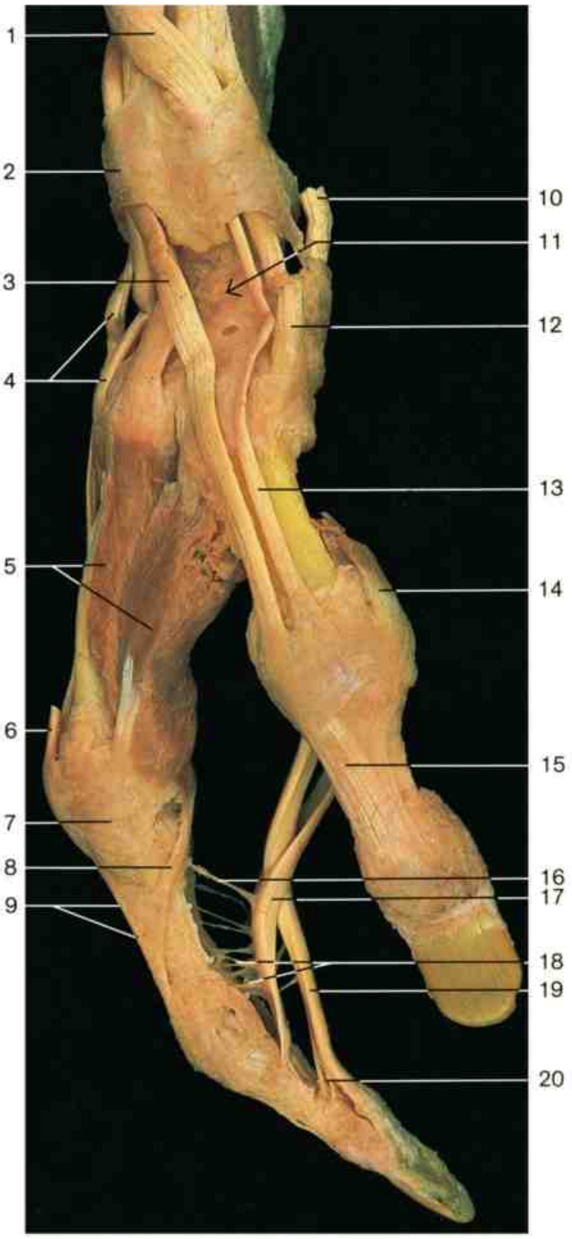
Position of extensor muscles of forearm and hand (schematic drawing).

A Extensors of thumb

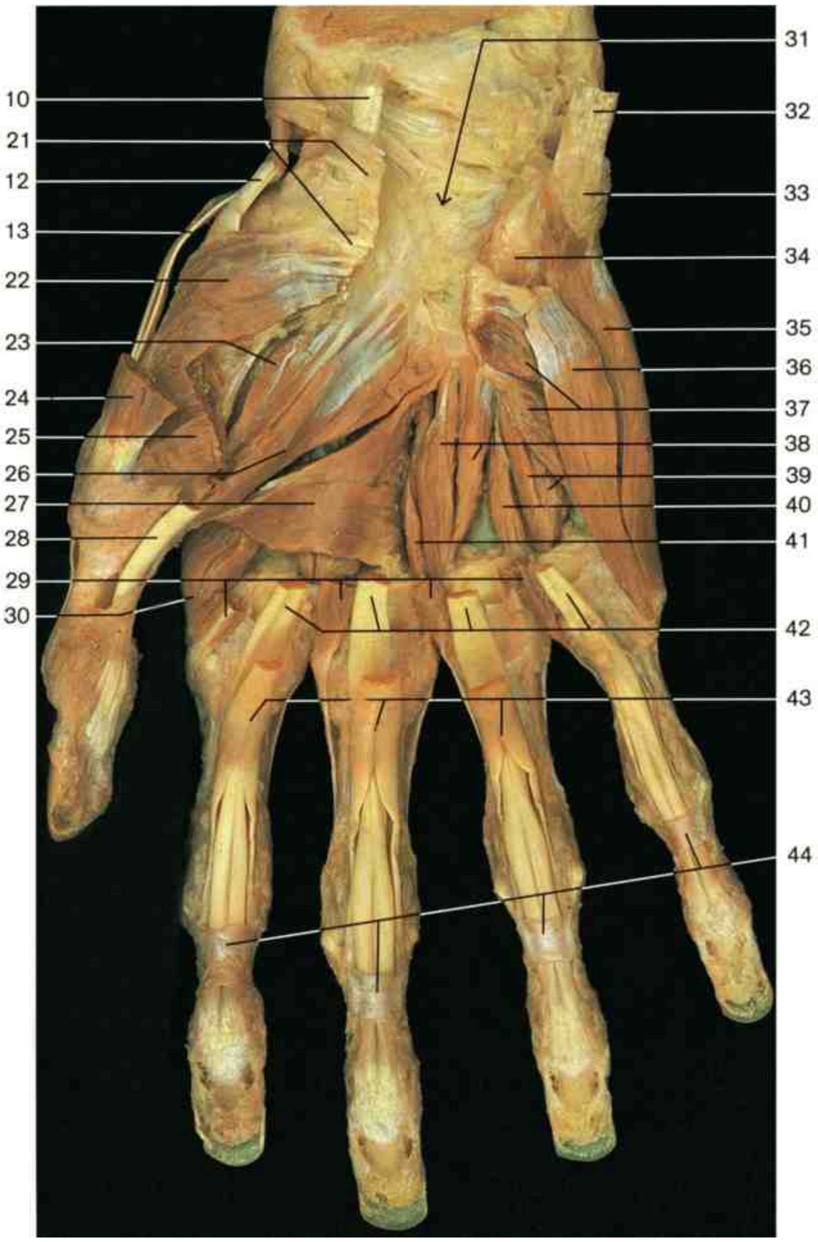
1 Abductor pollicis longus muscle (red)
2 Extensor pollicis brevis muscle (blue)
3 Extensor pollicis longus muscle (red)
4 Extensor indicis muscle (blue)

B Extensors of fingers and hand

5 Extensor carpi ulnaris muscle (blue)
6 Extensor digitorum muscle (red)
7 Extensor carpi radialis brevis muscle (blue)
8 Extensor carpi radialis longus muscle (blue)

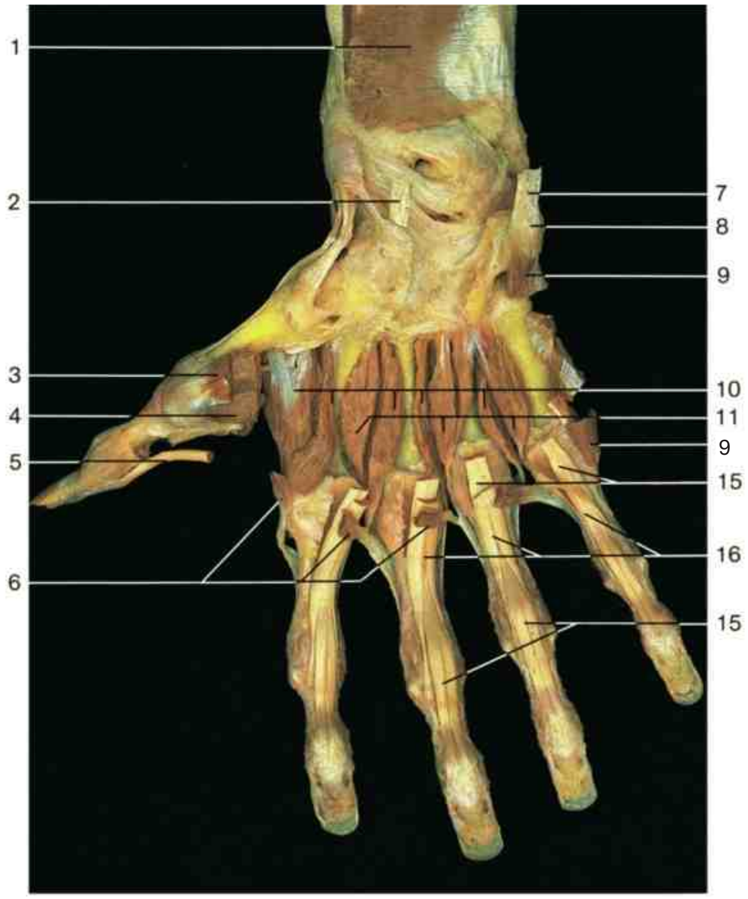


Muscles of thumb and index finger (medial aspect). The tendons of the extensor muscles of the thumb and the insertion of the flexor tendons of the index finger are displayed.

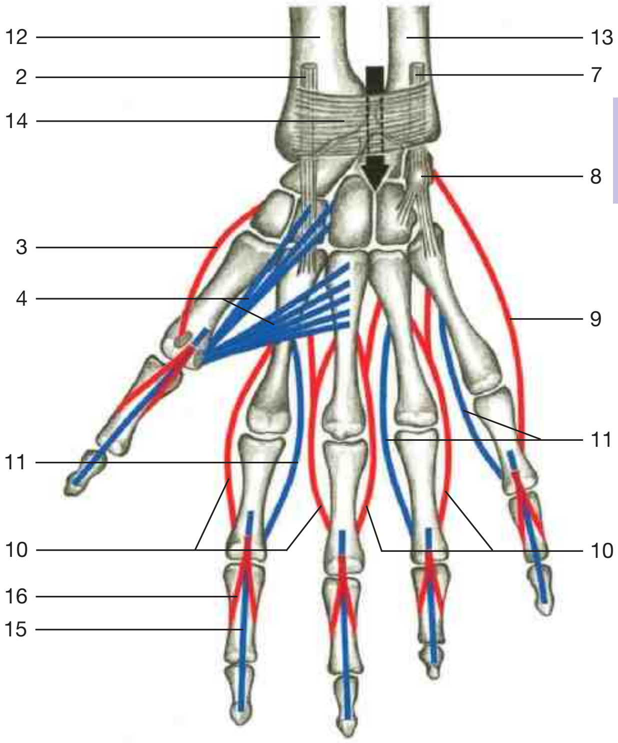


Muscles of right hand (palmar aspect). The tendons of the flexor muscles and parts of the thumb muscles have been removed. The carpal tunnel has been opened.

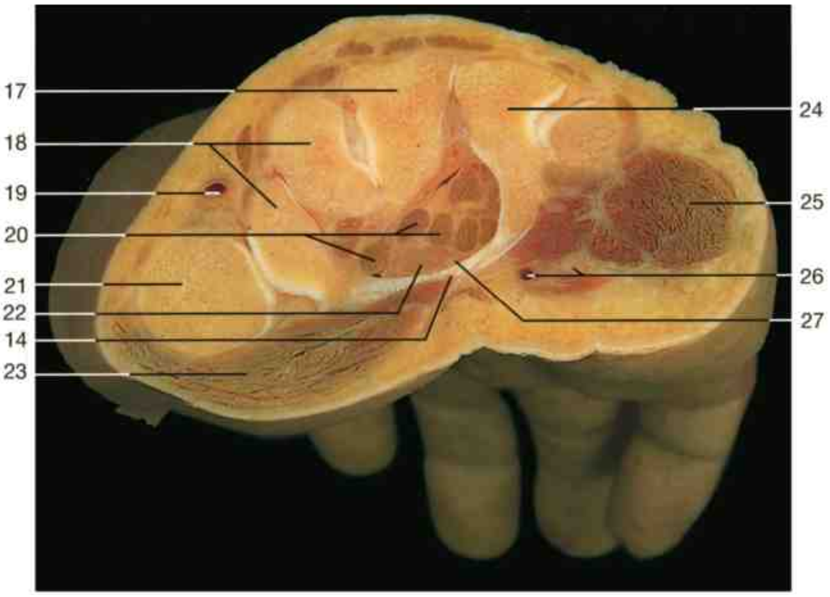
1 Tendons of extensor pollicis brevis and abductor pollicis longus muscle
2 Extensor retinaculum
3 Tendon of extensor pollicis longus muscle
4 Tendons of extensor carpi radialis longus and brevis muscles
5 First dorsal interosseous muscle
6 Tendon of extensor digitorum muscle for index finger
7 Location of metacarpophalangeal joint
8 Tendon of lumbrical muscle
9 Extensor expansion of index finger
10 Tendon of flexor carpi radialis muscle (cut)
11 Anatomical snuffbox
12 Tendon of abductor pollicis longus muscle
13 Tendon of extensor pollicis brevis muscle
14 Tendon of abductor pollicis brevis muscle
15 Extensor expansion of extensor of thumb
16 Vinculum longum
17 Tendons of flexor digitorum superficialis muscle dividing to allow passage of deep tendons
18 Vincula of flexor tendons
19 Tendon of flexor digitorum profundus muscle
20 Vinculum breve
21 Radial carpal eminence (cut edge of flexor retinaculum)
22 Opponens pollicis muscle
23 Deep head of flexor pollicis brevis muscle
24 Abductor pollicis brevis muscle (cut)
25 Superficial head of flexor pollicis brevis muscle (cut)
26 Oblique head of adductor pollicis muscle
27 Transverse head of adductor pollicis muscle
28 Tendon of flexor pollicis longus muscle (cut)
29 Lumbrical muscles (cut)
30 First dorsal interosseous muscle
31 Position of carpal tunnel
32 Tendon of flexor carpi ulnaris muscle
33 Location of pisiform bone
34 Hook of hamate bone
35 Abductor digiti minimi muscle
36 Flexor digiti minimi brevis muscle
37 Opponens digiti minimi muscle
38 Second palmar interosseous muscle
39 Third palmar interosseous muscle
40 Fourth dorsal interosseous muscle
41 Third dorsal interosseous muscle
42 Tendon of flexor digitorum profundus muscle (cut)
43 Tendons of flexor digitorum superficialis muscle (cut)
44 Fibrous flexor sheaths



Muscles of right hand, deep layer (palmar aspect). The thenar and hypothenar muscles have been removed to display the interosseous muscles.

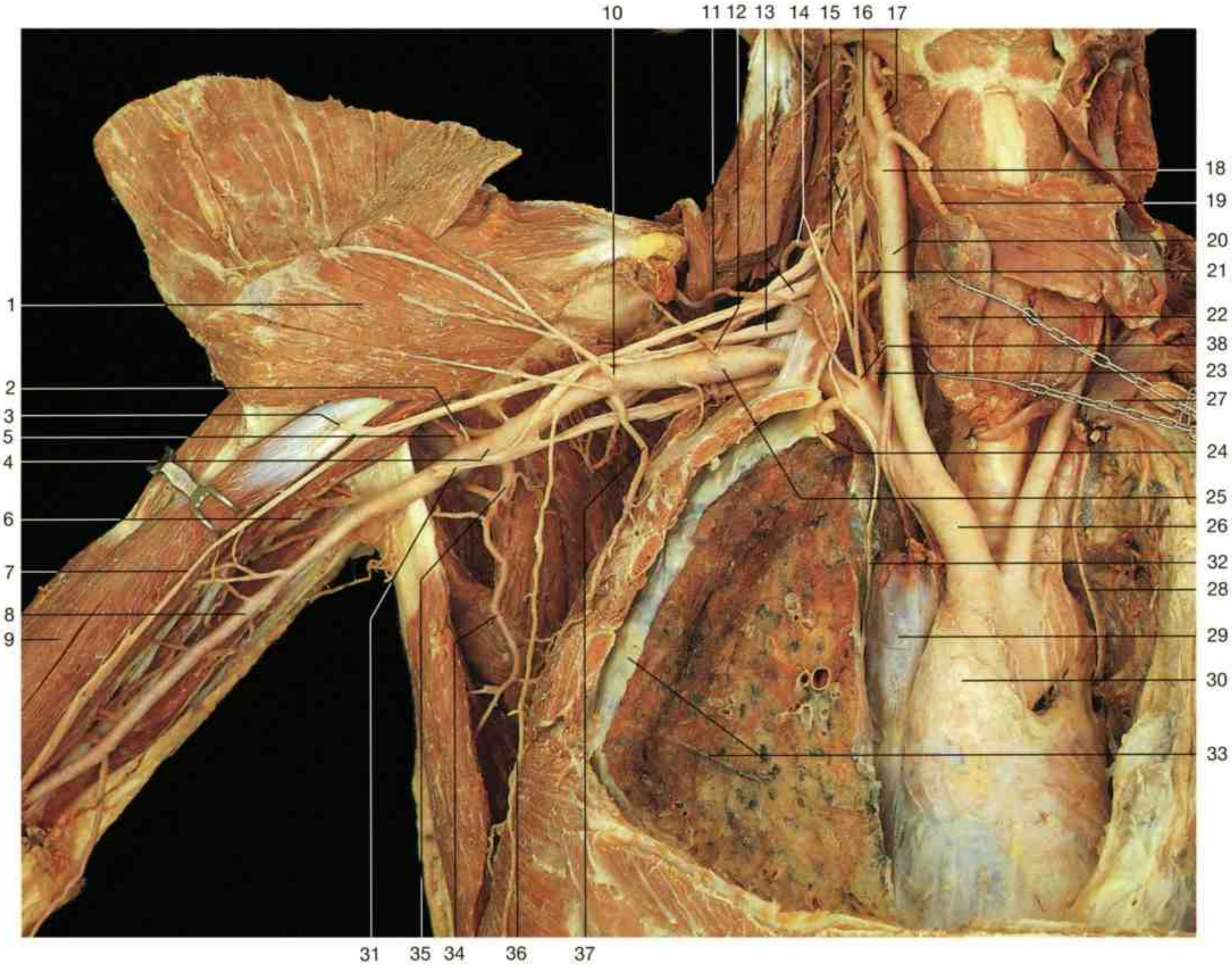


Actions of interosseous muscles in abduction and adduction of fingers (palmar aspect, schematic drawing).
Arrow: carpal tunnel.
Red = abduction (dorsal interosseous, abductor digiti minimi, and abductor pollicis brevis muscles)
Blue = adduction (palmar interosseous muscles, adductor pollicis muscle)



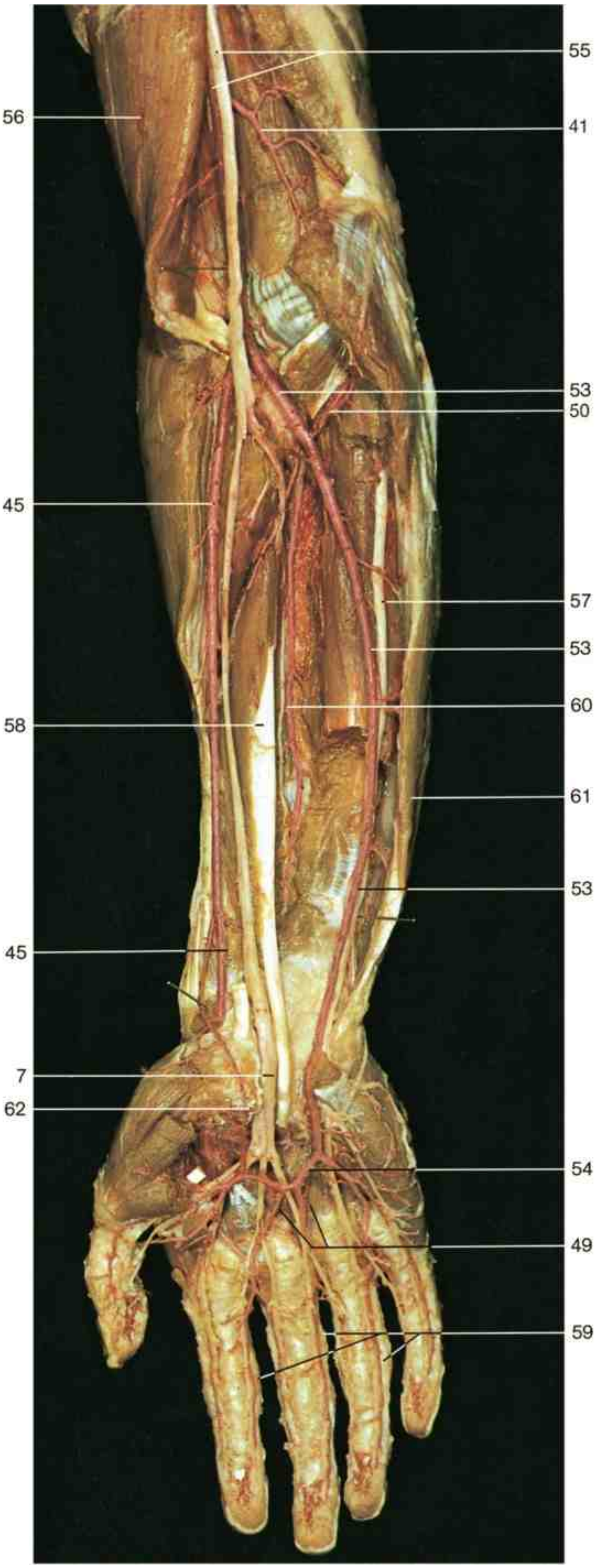
Transverse section through the right hand, showing the carpal tunnel (canalis carpi).

1	Pronator quadratus muscle
2	Tendon of flexor carpi radialis muscle
3	Abductor pollicis brevis muscle (divided)
4	Adductor pollicis muscle (divided)
5	Tendon of flexor pollicis longus muscle
6	Lumbrical muscles (cut)
7	Tendon of flexor carpi ulnaris muscle
8	Pisiform bone
9	Abductor digiti minimi muscle (divided)
10	Dorsal interosseous muscles
11	Palmar interosseous muscles
12	Radius
13	Ulna
14	Flexor retinaculum
15	Tendons of flexor digitorum profundus muscle
16	Tendons of flexor digitorum superficialis muscle
17	Capitate bone
18	Trapezium bone and trapezoid bone
19	Radial artery
20	Tendon of flexor muscles
21	First metacarpal bone
22	Median nerve
23	Thenar muscles
24	Hamate bone
25	Hypothenar muscles
26	Ulnar artery and nerve
27	Carpal tunnel (canalis carpi)



Main branches of right subclavian and axillary arteries (anterior aspect). Pectoralis muscles have been reflected, clavicle and anterior wall of thorax removed, and right lung divided. Left lung with pleura and thyroid gland have been reflected laterally to display aortic arch and common carotid artery with their branches.

1	Pectoralis minor muscle (reflected)
2	Anterior circumflex humeral artery
3	Musculocutaneous nerve (divided)
4	Axillary artery
5	Posterior circumflex humeral artery
6	Profunda brachii artery
7	Median nerve (var.)
8	Brachial artery
9	Biceps brachii muscle
10	Thoraco-acromial artery
11	Suprascapular artery
12	Descending scapular artery
13	Brachial plexus (middle trunk)
14	Transverse cervical artery
15	Scalenus anterior muscle and phrenic nerve
16	Right internal carotid artery
17	Right external carotid artery
18	Carotid sinus
19	Superior thyroid artery
20	Right common carotid artery
21	Ascending cervical artery
22	Thyroid gland
23	Inferior thyroid artery
24	Internal thoracic artery
25	Right subclavian artery
26	Brachiocephalic trunk
27	Left brachiocephalic vein (divided)
28	Left vagus nerve
29	Superior vena cava (divided)
30	Ascending aorta
31	Median nerve (divided)
32	Phrenic nerve
33	Right lung (divided) and pulmonary pleura
34	Thoracodorsal artery
35	Subscapular artery
36	Lateral mammary branches (variant)
37	Lateral thoracic artery
38	Thyrocervical trunk
39	Superior thoracic artery
40	Superior ulnar collateral artery
41	Inferior ulnar collateral artery
42	Middle collateral artery
43	Radial collateral artery
44	Radial recurrent artery
45	Radial artery
46	Anterior and posterior interosseous arteries
47	Princeps pollicis artery
48	Deep palmar arch
49	Common palmar digital arteries
50	Ulnar recurrent artery
51	Recurrent interosseous artery
52	Common interosseous artery
53	Ulnar artery
54	Superficial palmar arch
55	Median nerve and brachial artery
56	Biceps brachii muscle
57	Ulnar nerve
58	Flexor pollicis longus muscle
59	Palmar digital arteries
60	Anterior interosseous artery
61	Flexor carpi ulnaris muscle
62	Superficial palmar branch of radial artery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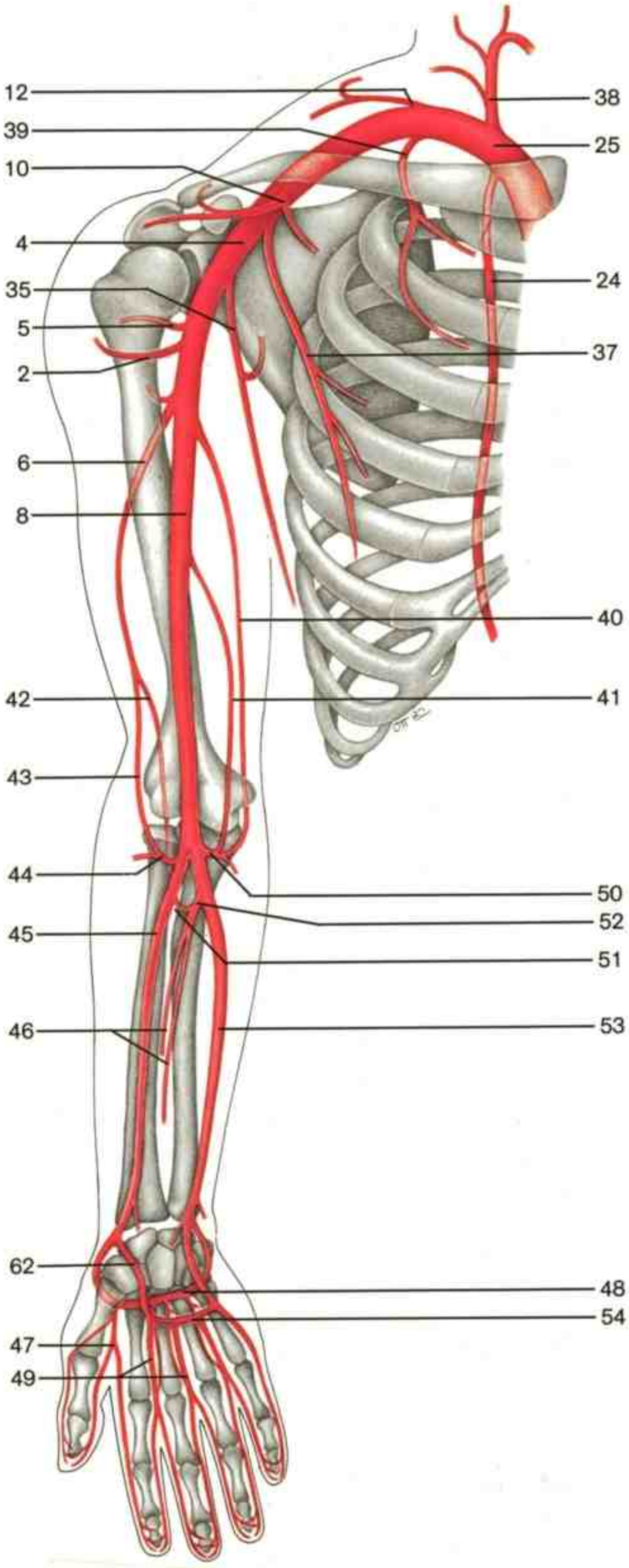
Dissection of the arteries of forearm and hand.
The superficial flexor muscles have been removed, the carpal tunnel opened, and the flexor retinaculum cut. The arteries have been filled with colored resin.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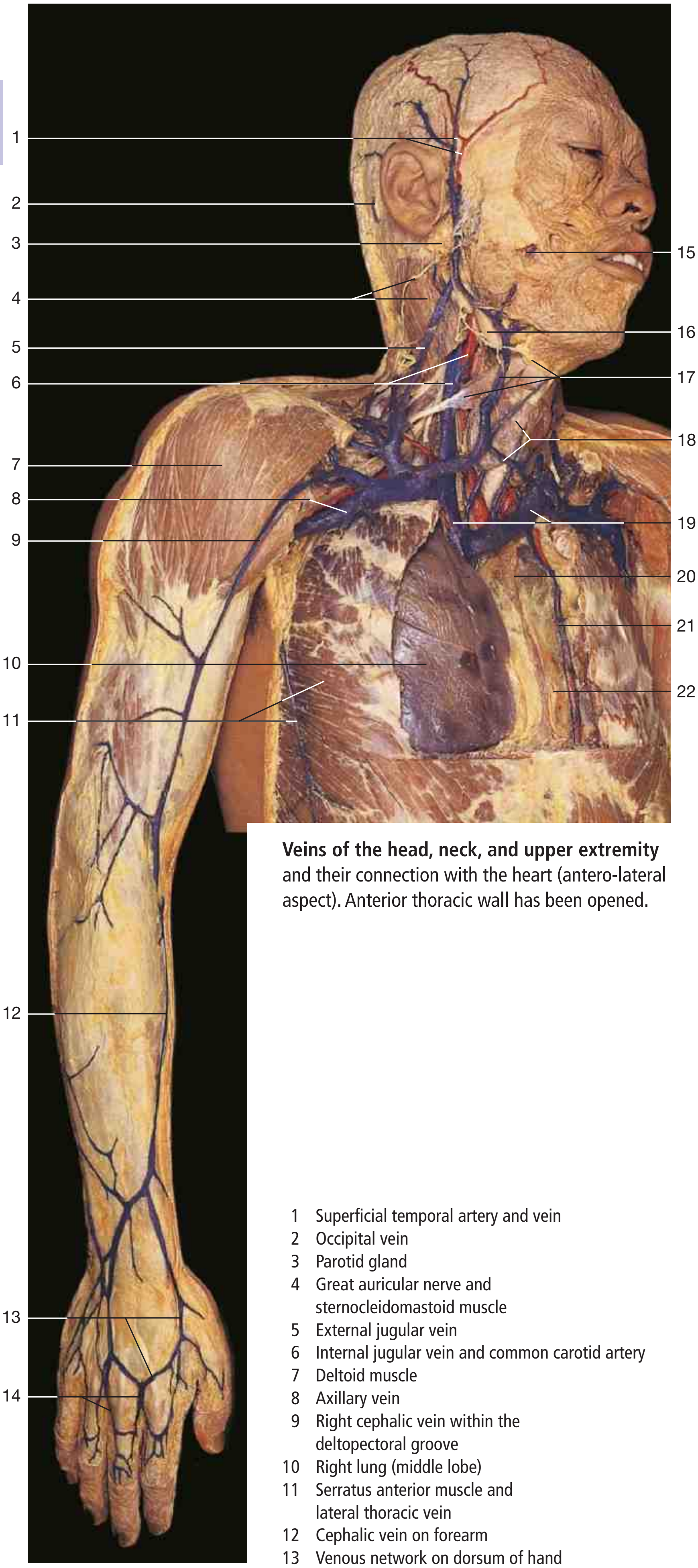
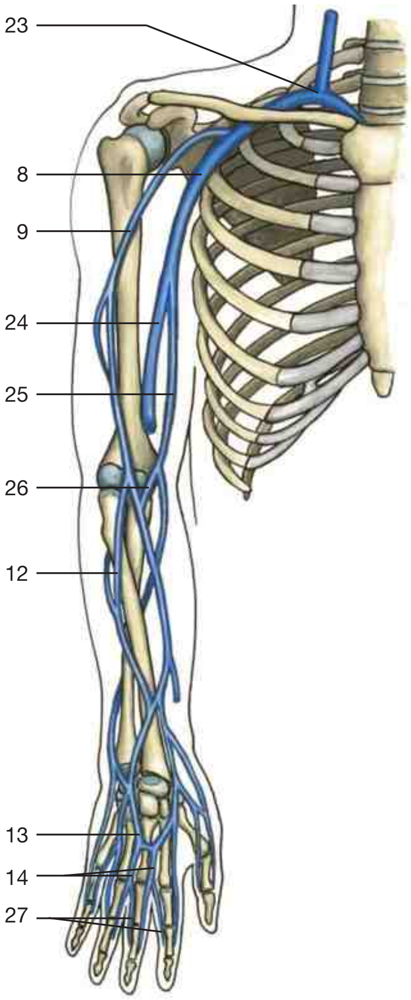
Arteries of the upper limb (schematic drawing).

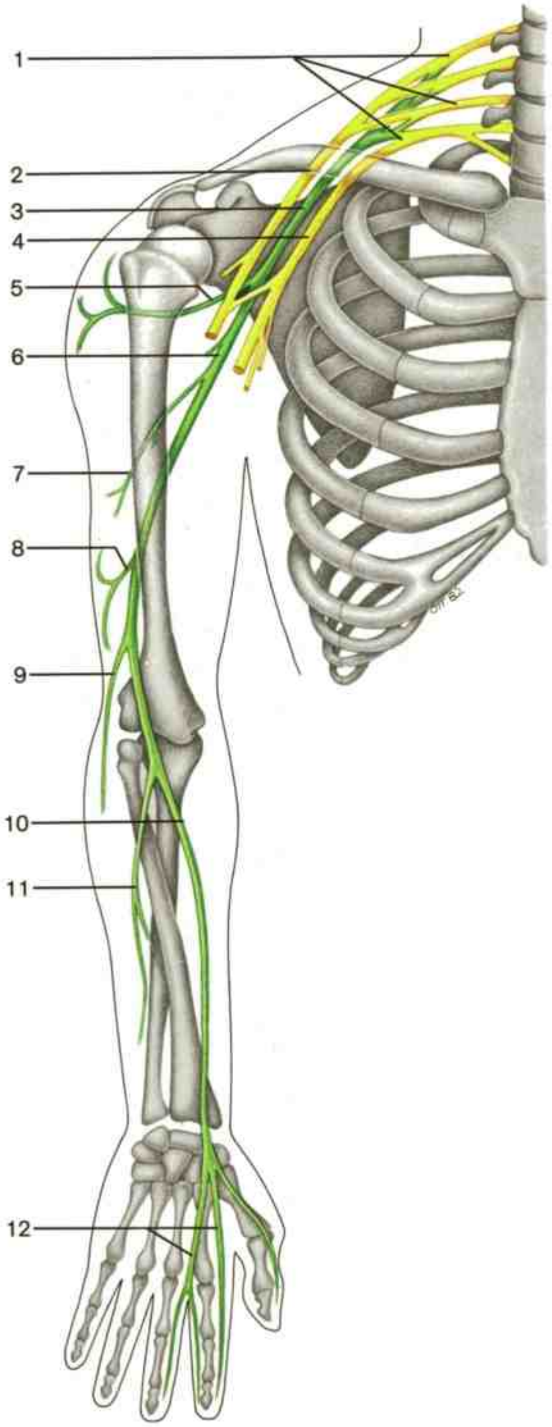


Veins of the head, neck, and upper extremity and their connection with the heart (antero-lateral aspect). Anterior thoracic wall has been opened.

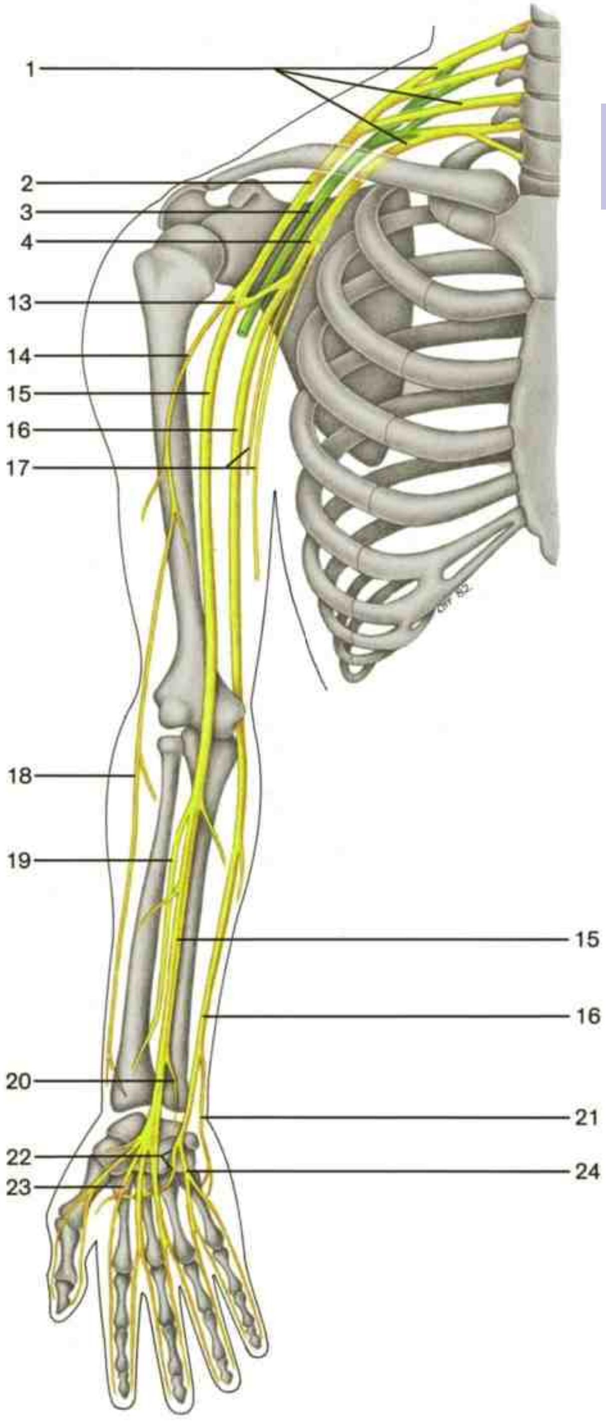


Superficial veins of upper limb (schematic drawing).

1 Superficial temporal artery and vein
2 Occipital vein
3 Parotid gland
4 Great auricular nerve and sternocleidomastoid muscle
5 External jugular vein
6 Internal jugular vein and common carotid artery
7 Deltoid muscle
8 Axillary vein
9 Right cephalic vein within the deltopectoral groove
10 Right lung (middle lobe)
11 Serratus anterior muscle and lateral thoracic vein
12 Cephalic vein on forearm
13 Venous network on dorsum of hand
14 Dorsal metacarpal veins
15 Facial artery and vein
16 Submandibular gland
17 Anterior jugular vein, hyoid bone, and omohyoid muscle
18 Jugular venous arch and thyroid gland
19 Right and left brachiocephalic veins
20 Retrosternal body (remnant of thymus gland)
21 Internal thoracic artery and vein
22 Heart with pericardium
23 Right venous angle
24 Brachial vein
25 Basilic vein
26 Median cubital vein
27 Digital veins



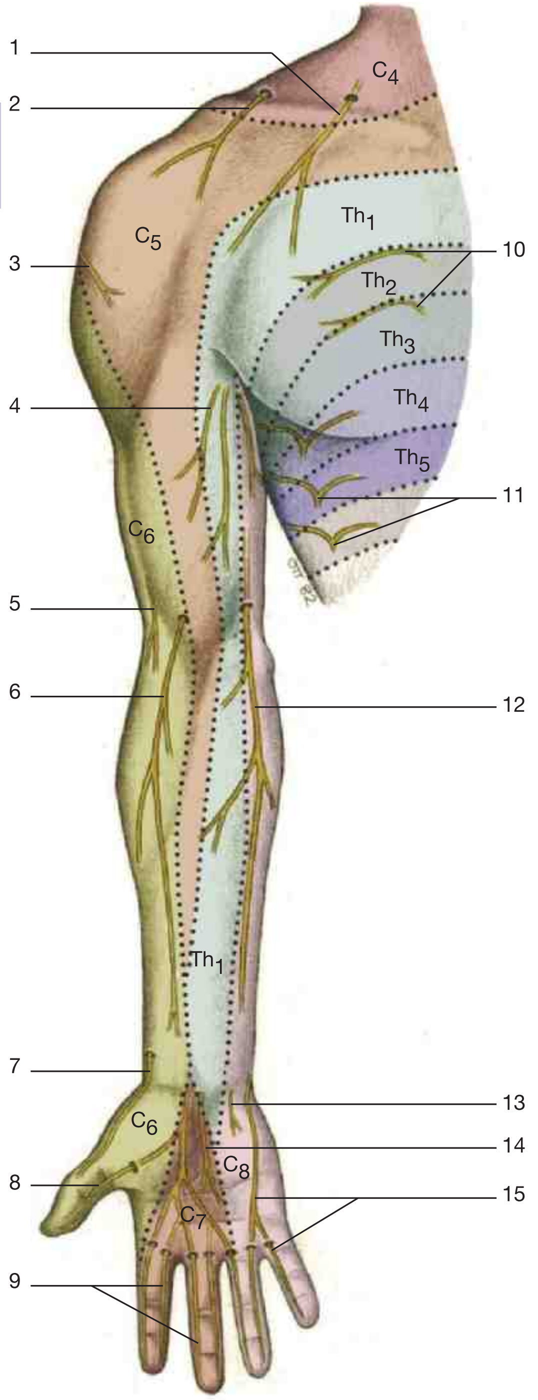
Main branches of radial nerve (schematic drawing).
Posterior divisions of trunks and posterior cord and its branches are indicated in green.



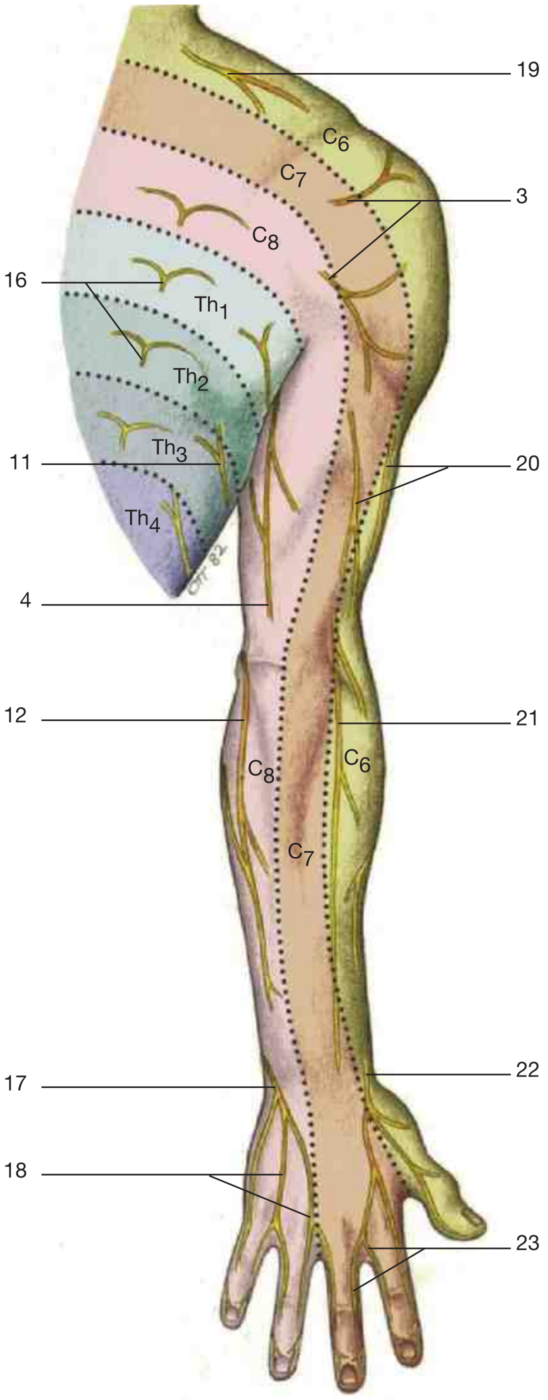
Main branches of musculocutaneous, median, and ulnar nerves (schematic drawing).
Anterior divisions of the trunks and all the components arising from them are indicated in yellow.

1 Brachial plexus
2 Lateral cord of brachial plexus
3 Posterior cord of brachial plexus
4 Medial cord of brachial plexus
5 Axillary nerve
6 Radial nerve
7 Posterior cutaneous nerve of arm
8 Lower lateral cutaneous nerve of arm
9 Posterior cutaneous nerve of forearm
10 Superficial branch of radial nerve
11 Deep branch of radial nerve
12 Dorsal digital nerves

13 Roots of median nerve
14 Musculocutaneous nerve
15 Median nerve
16 Ulnar nerve
17 Medial cutaneous nerves of arm and forearm
18 Lateral cutaneous nerve of forearm
19 Anterior interosseous nerve
20 Palmar branch of median nerve
21 Dorsal branch of ulnar nerve
22 Deep branch of ulnar nerve
23 Common palmar digital nerves of median nerve
24 Superficial branch of ulnar nerve

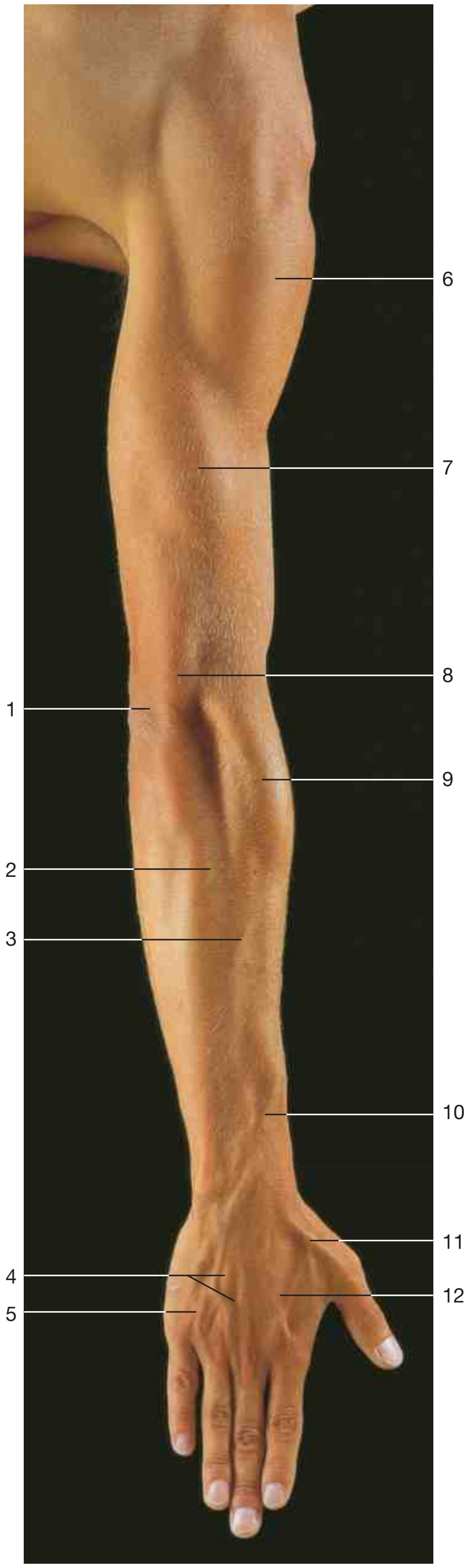


Cutaneous nerves of the right upper limb
(ventral aspect, schematic drawing).

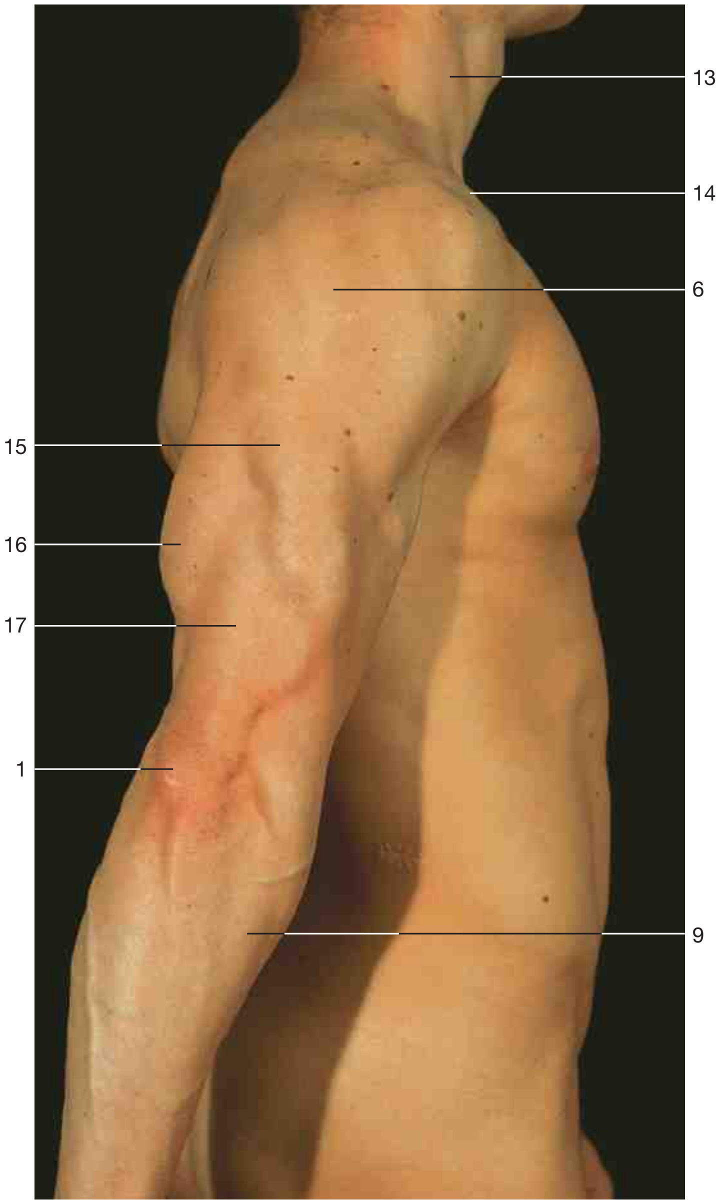


Cutaneous nerves of the right upper limb
(dorsal aspect, schematic drawing).

1 Medial supraclavicular nerve
2 Intermediate supraclavicular nerve
3 Upper lateral cutaneous nerve of arm
4 Terminal branches of intercostobrachial nerves
5 Lower lateral cutaneous nerve of arm
6 Lateral cutaneous nerve of forearm
7 Terminal branch of superficial branch of radial nerve
8 Palmar digital nerve of thumb (branch of median nerve)
9 Palmar digital branches of median nerve
10 Anterior cutaneous branches of intercostal nerves
11 Lateral cutaneous branches of intercostal nerves
12 Medial cutaneous nerve of forearm
13 Palmar cutaneous branch of ulnar nerve
14 Palmar branch of median nerve
15 Palmar digital branches of ulnar nerve
16 Cutaneous branches of dorsal rami of spinal nerves
17 Dorsal branch of ulnar nerve
18 Dorsal digital nerves
19 Posterior supraclavicular nerve
20 Posterior cutaneous nerve of arm
21 Posterior cutaneous nerve of forearm
22 Superficial branch
23 Dorsal digital branches
} from radial nerve

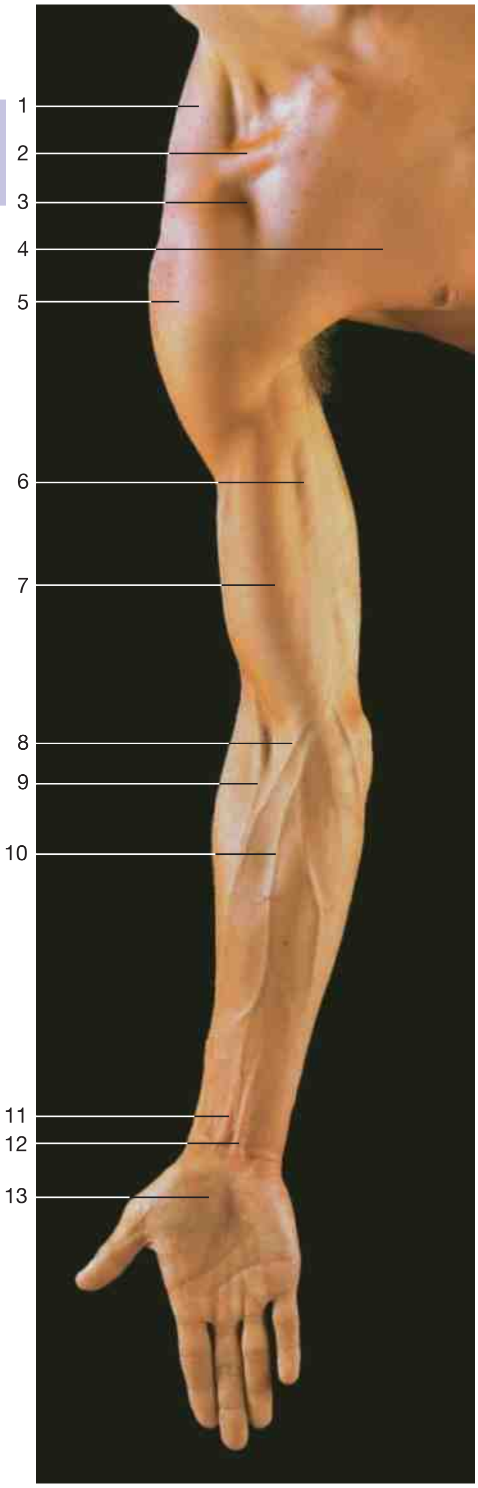


Surface anatomy of the right arm and hand (posterior aspect).

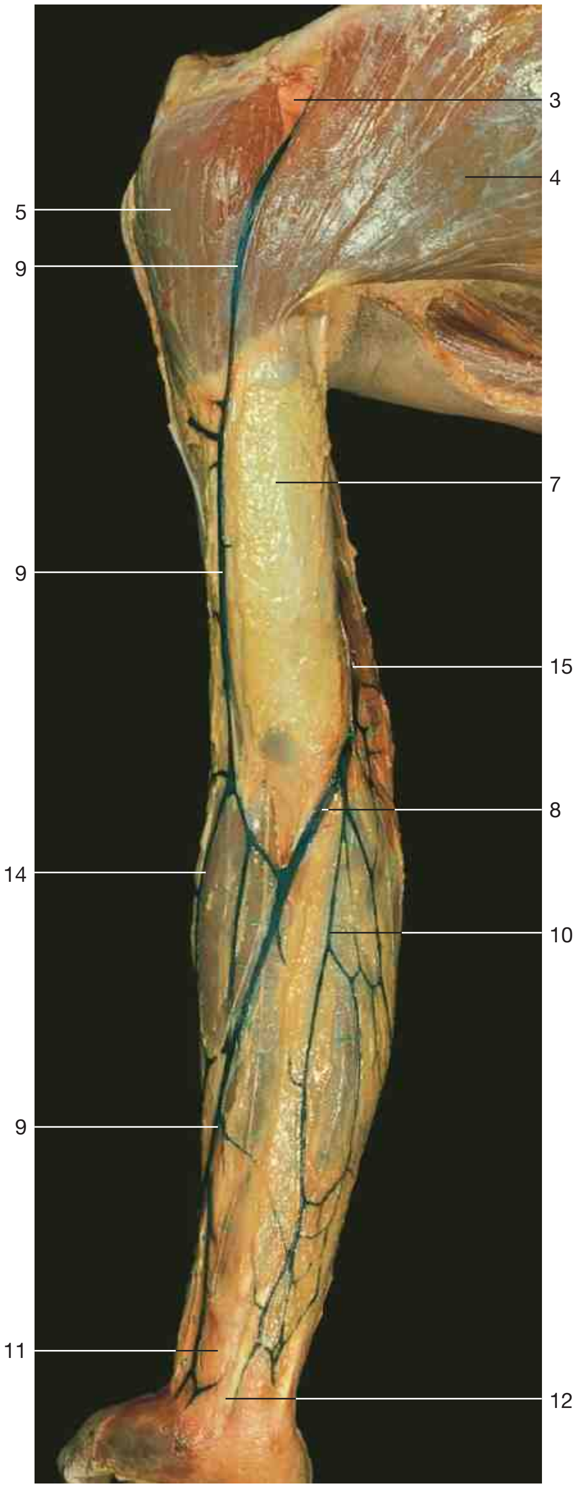


Surface anatomy of the right arm (lateral aspect). Triceps brachii muscle is strongly contracted.

1 Olecranon
2 Extensor muscles of forearm
3 Accessory cephalic vein
4 Tendons of extensor digitorum muscle
5 Dorsal venous network of hand
6 Deltoid muscle
7 Triceps brachii muscle
8 Lateral epicondyle of humerus
9 Brachioradialis muscle
10 Cephalic vein
11 Tendon of abductor pollicis longus muscle
12 Tendon of extensor indicis muscle
13 Sternocleidomastoid muscle
14 Clavicle
15 Lateral head of triceps brachii muscle
16 Medial head of triceps brachii muscle
17 Tendon of triceps brachii muscle

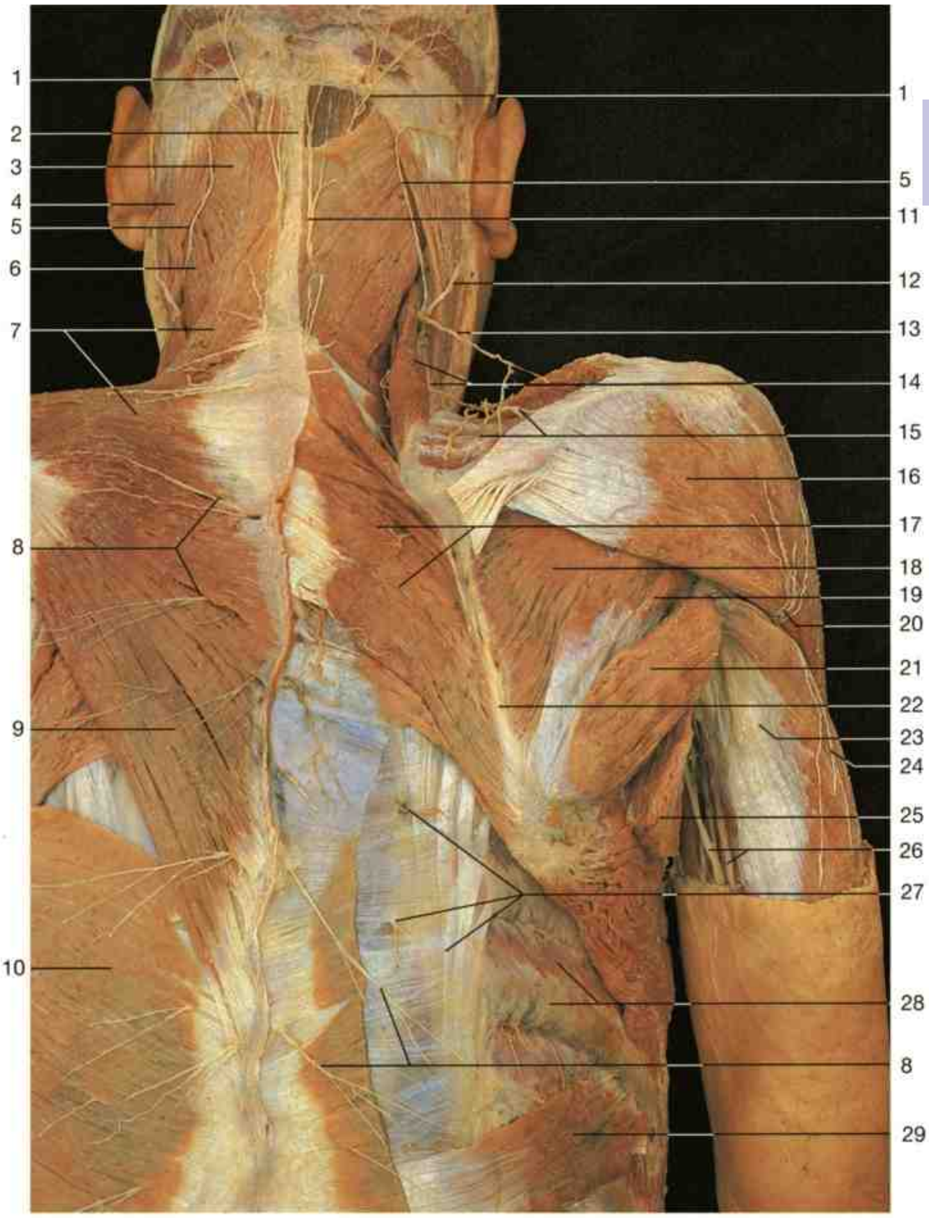


Surface anatomy of the right arm and hand (anterior aspect).



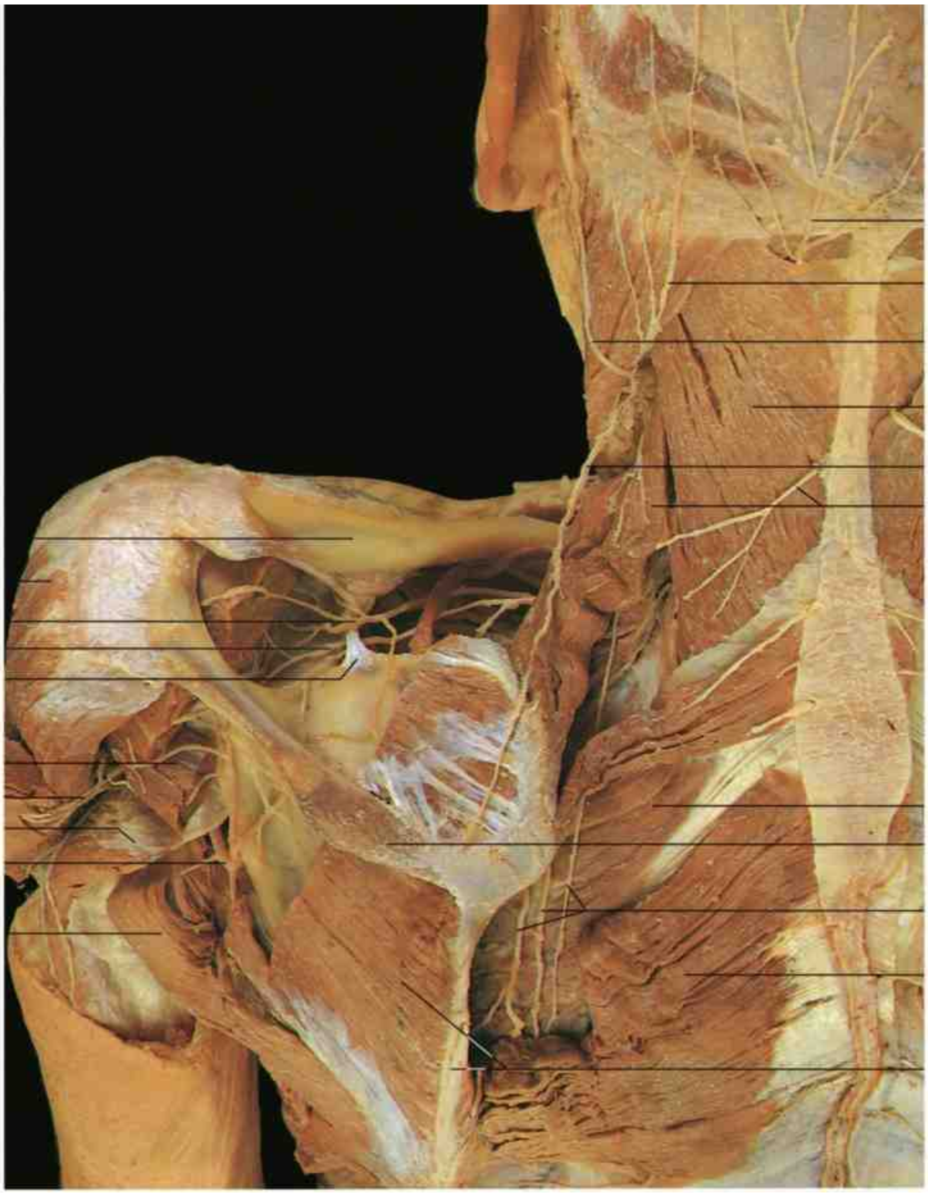
Superficial veins of the right arm, injected with blue gelatine (anterior aspect).

1 Trapezius muscle
2 Clavicle
3 Deltopectoral triangle
4 Pectoralis major muscle
5 Deltoid muscle
6 Brachial vein
7 Biceps brachii muscle
8 Median cubital vein
9 Cephalic vein
10 Median vein of forearm
11 Tendon of flexor carpi radialis
12 Tendon of palmaris longus muscle
13 Location of adductor pollicis muscle
14 Accessory cephalic vein
15 Basilic vein



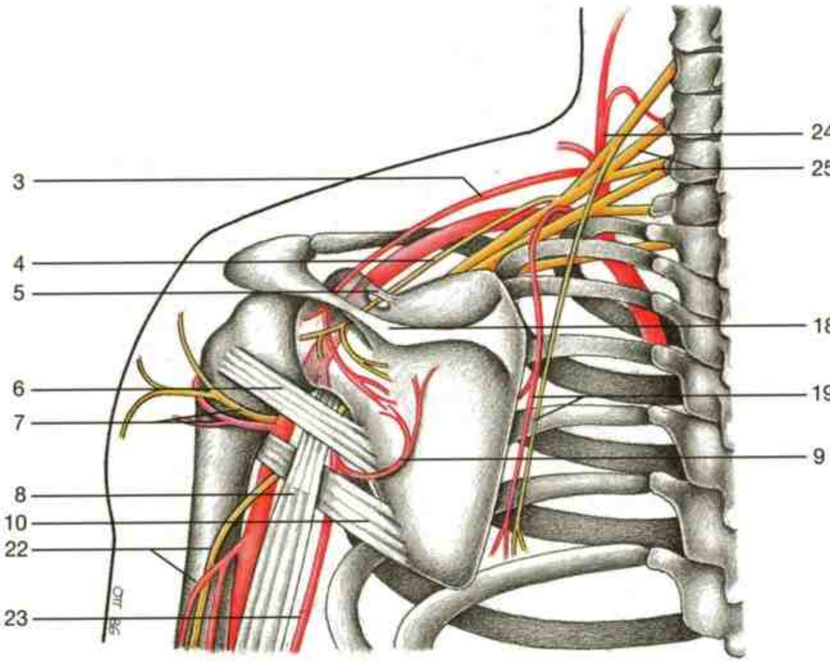
Posterior regions of neck and shoulder (dorsal aspect). Left side: superficial layer. Right side: trapezius and latissimus dorsi muscles have been removed. Dissection of dorsal branches of spinal nerves.

1	Greater occipital nerve
2	Ligamentum nuchae
3	Splenius capitis muscle
4	Sternocleidomastoid muscle
5	Lesser occipital nerve
6	Splenius cervicis muscle
7	Descending and transverse fibers of trapezius muscle
8	Medial cutaneous branches of dorsal rami of spinal nerves
9	Ascending fibers of trapezius muscle
10	Latissimus dorsi muscle
11	Cutaneous branch of third occipital nerve
12	Great auricular nerve
13	Accessory nerve (n. XI)
14	Posterior supraclavicular nerve and levator scapulae muscle
15	Branches of suprascapular artery
16	Deltoid muscle
17	Rhomboid major muscle
18	Infraspinatus muscle
19	Teres minor muscle
20	Upper lateral cutaneous nerve of arm (branch of axillary nerve)
21	Teres major muscle
22	Medial margin of scapula
23	Long head of triceps muscle
24	Posterior cutaneous nerve of arm (branch of radial nerve)
25	Latissimus dorsi muscle (divided)
26	Ulnar nerve and brachial artery
27	Lateral cutaneous branches of dorsal rami of spinal nerves and iliocostalis thoracis muscle
28	External intercostal muscle and seventh rib
29	Serratus posterior inferior muscle

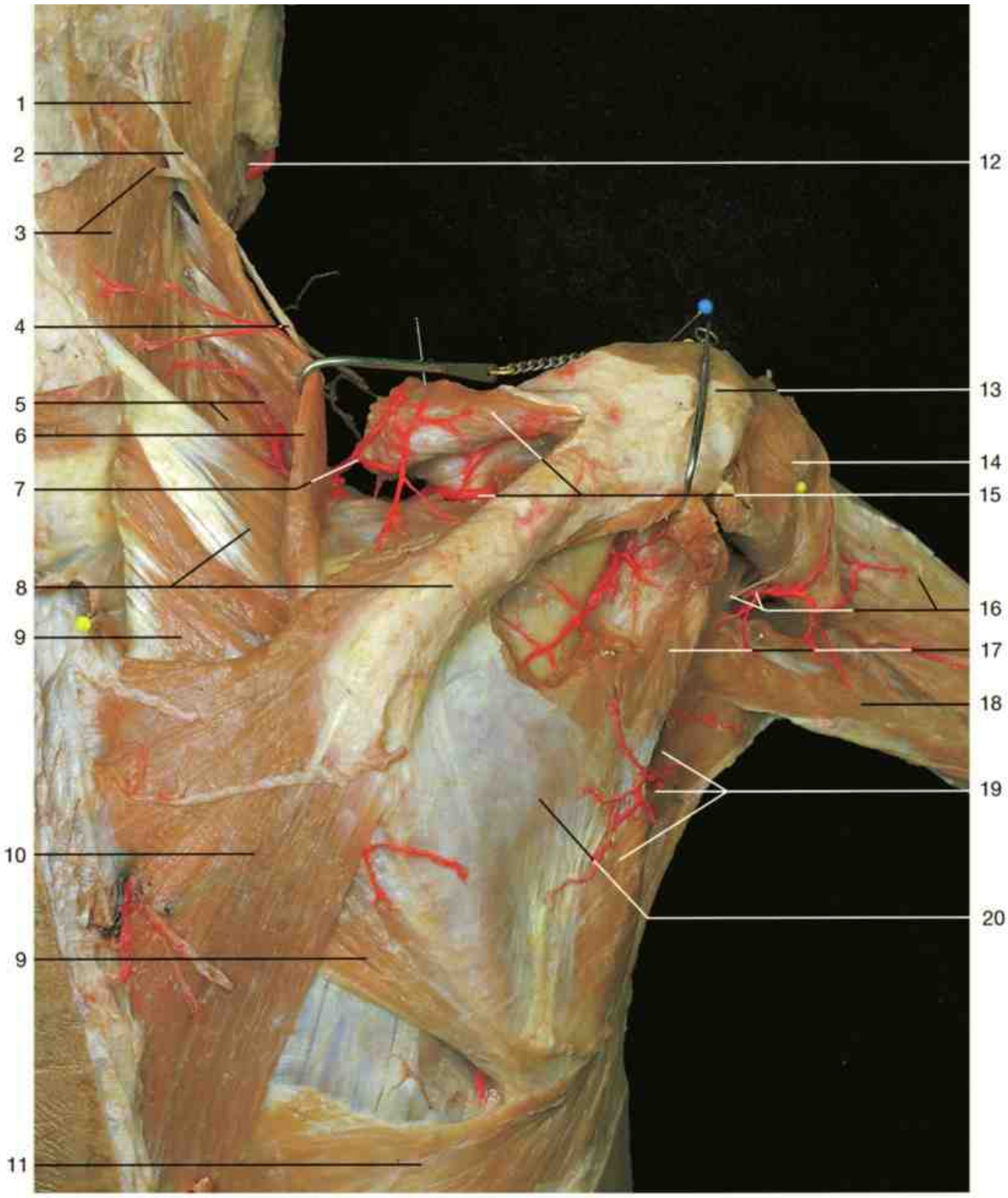


Posterior region of shoulder, deepest layer. Rhomboid and scapular muscles fenestrated; posterior part of deltoid muscle reflected.

1	Clavicle
2	Deltoid muscle
3	Suprascapular artery
4	Suprascapular nerve
5	Superior transverse scapular ligament
6	Teres minor muscle
7	Axillary nerve and posterior circumflex humeral artery
8	Long head of triceps muscle
9	Circumflex scapular artery
10	Teres major muscle
11	Greater occipital nerve
12	Lesser occipital nerve
13	Great auricular nerve
14	Splenius capitis muscle
15	Accessory nerve (n. XI)
16	Third occipital nerve and levator scapulae muscle
17	Serratus posterior superior muscle
18	Spine of scapula
19	Descending scapular artery and dorsal scapular nerve
20	Rhomboid major muscle
21	Infraspinatus muscle and medial margin of scapula
22	Radial nerve and profunda brachii artery
23	Thoracodorsal artery
24	Thyrocervical trunk
25	Roots of brachial plexus

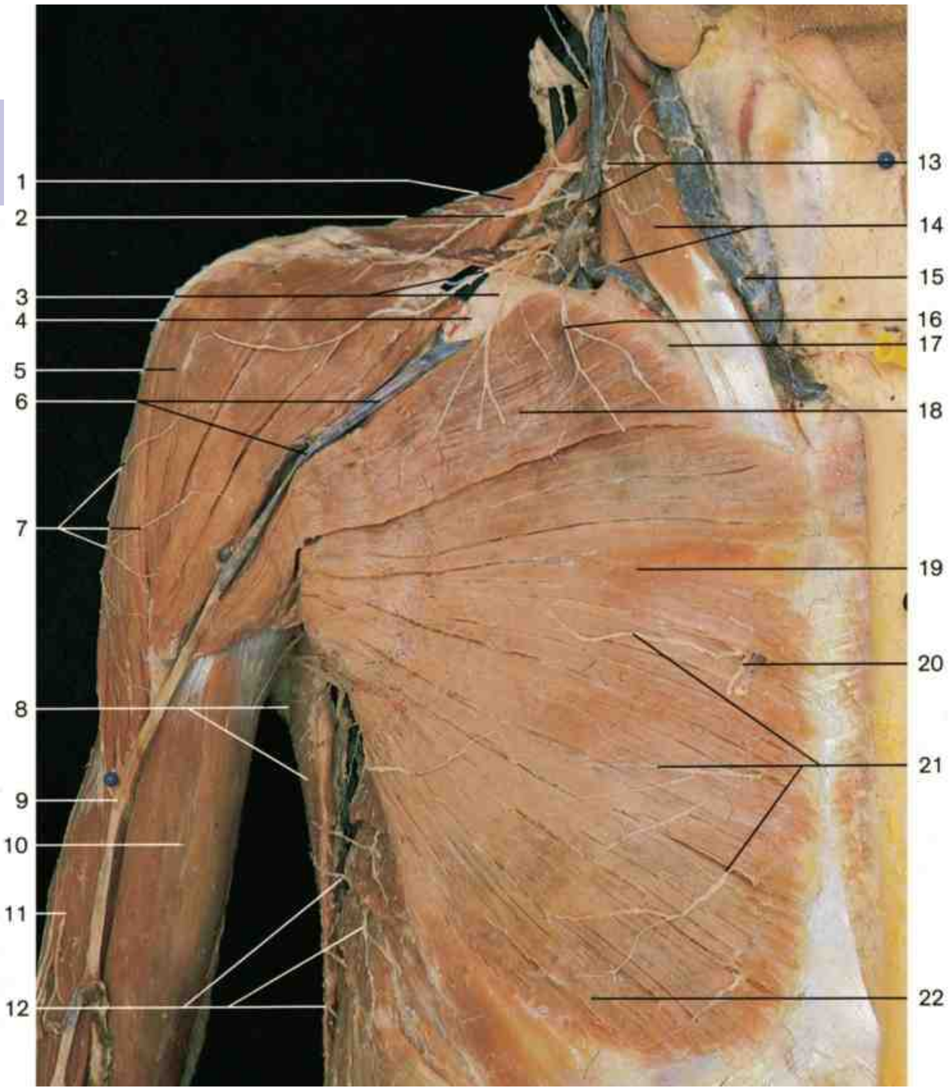


Collateral circulation of shoulder. Anastomosis of suprascapular and circumflex scapular arteries (schematic drawing).



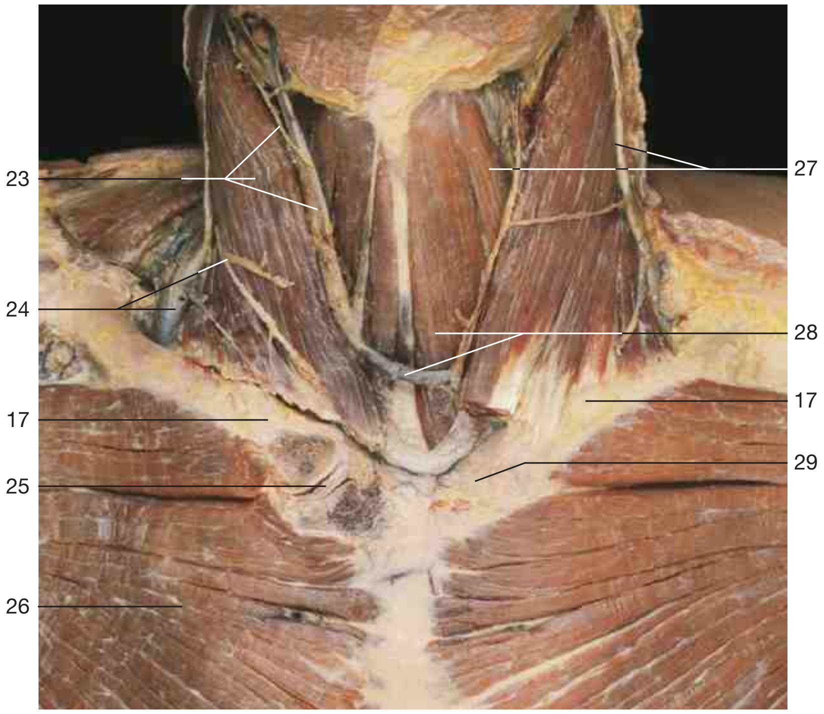
Posterior region of shoulder, deep layer**.** Arteries of scapular region are injected. Trapezius, deltoid, and infraspinatus muscles are partially removed or reflected.

1	Sternocleidomastoid muscle	10	Trapezius muscle
2	Lesser occipital nerve	11	Latissimus dorsi muscle
3	Splenius capitis muscle and third occipital nerve	12	Facial artery
4	Accessory nerve (n. XI)	13	Acromion
5	Splenius cervicis muscle and transverse cervical artery (deep branch)	14	Deltoid muscle
6	Levator of scapula muscle	15	Suprascapular artery and supraspinatus muscle (reflected)
7	Transverse cervical artery (superficial branch)	16	Axillary nerve, posterior circumflex humeral artery, and lateral head of triceps brachii muscle
8	Spine of scapula and serratus posterior superior muscle	17	Teres minor muscle
9	Rhomboid major muscle	18	Long head of triceps brachii muscle
		19	Circumflex scapular artery and teres major
		20	Infraspinatus muscle

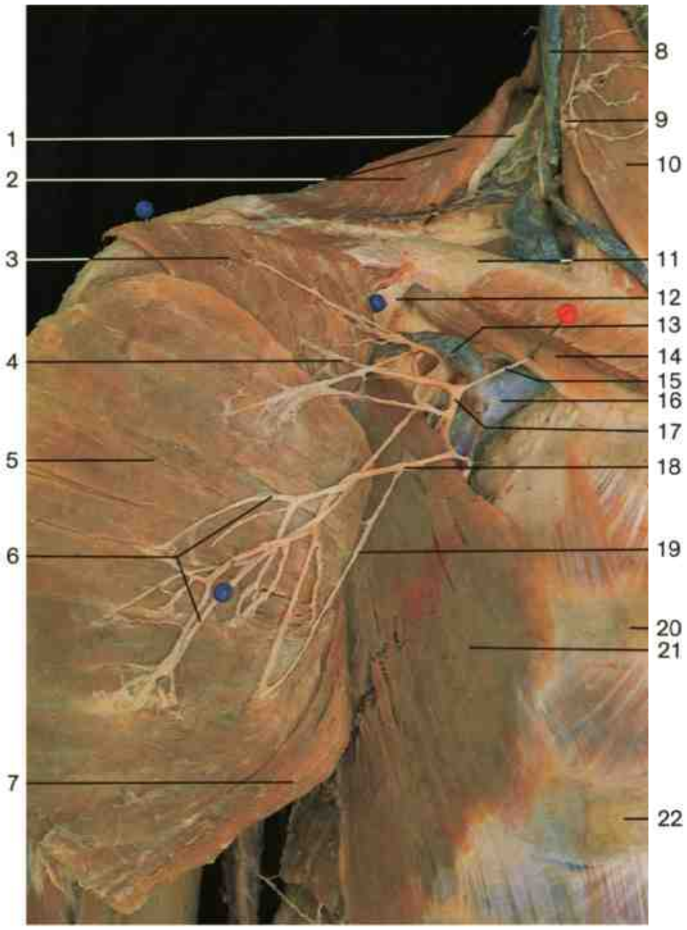


Right shoulder and thoracic wall, superficial layer (anterior aspect). Dissection of the cutaneous nerves and veins.

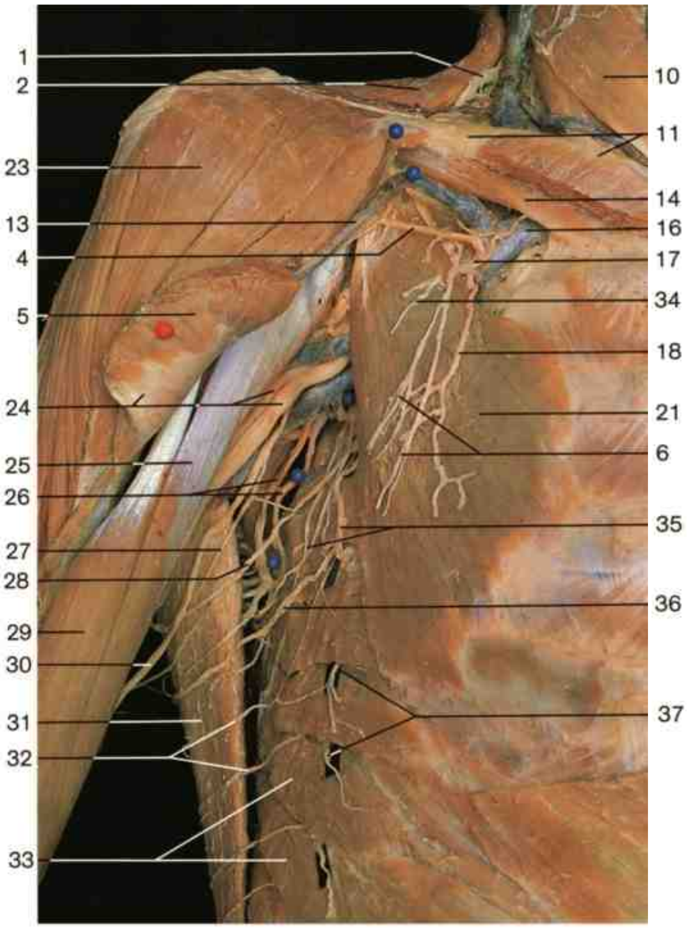
1 Trapezius muscle
2 Posterior supraclavicular nerve
3 Middle supraclavicular nerve
4 Deltopectoral triangle
5 Deltoid muscle
6 Cephalic vein within the deltopectoral groove
7 Upper lateral cutaneous nerve of arm (branch of axillary nerve)
8 Latissimus dorsi muscle
9 Cephalic vein
10 Biceps brachii muscle
11 Triceps brachii muscle
12 Lateral cutaneous branches of intercostal nerves
13 Transverse cervical nerve and external jugular vein
14 Sternocleidomastoid muscle
15 Anterior jugular vein
16 Anterior supraclavicular nerve
17 Clavicle
18 Clavicular part of pectoralis major muscle
19 Sternocostal part of pectoralis major muscle
20 Perforating branch of internal thoracic artery
21 Anterior cutaneous branches of intercostal nerves
22 Abdominal part of pectoralis major muscle
23 Sternocleidomastoid muscle, cervical branch of facial nerve, and anterior jugular vein
24 External jugular vein and transverse cervical nerve (inferior branch)
25 Sternoclavicular joint (opened) with articular disc
26 Pectoralis major muscle
27 Omohyoid muscle and external jugular vein
28 Jugular venous arch and sternohyoid muscle
29 Sternoclavicular joint (not opened)



Thoracic wall with neck region (anterior aspect). The sternoclavicular joint is depicted. On the right side the joint has been opened by a coronal section. Note the articular disc.

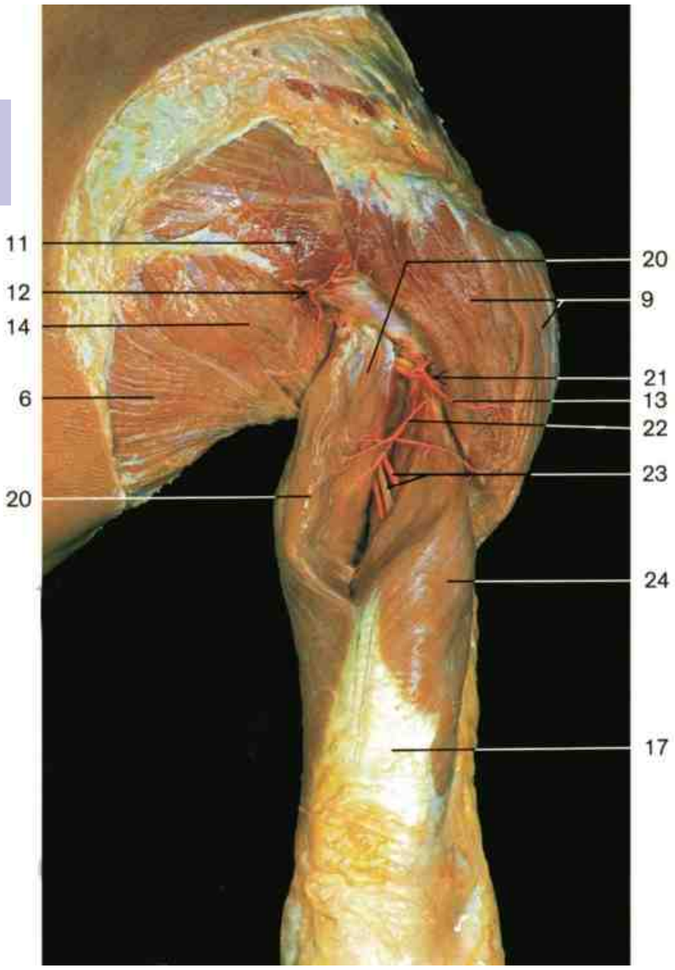


Right deltopectoral triangle, infraclavicular region (anterior aspect). The pectoralis major muscle has been cut and reflected.

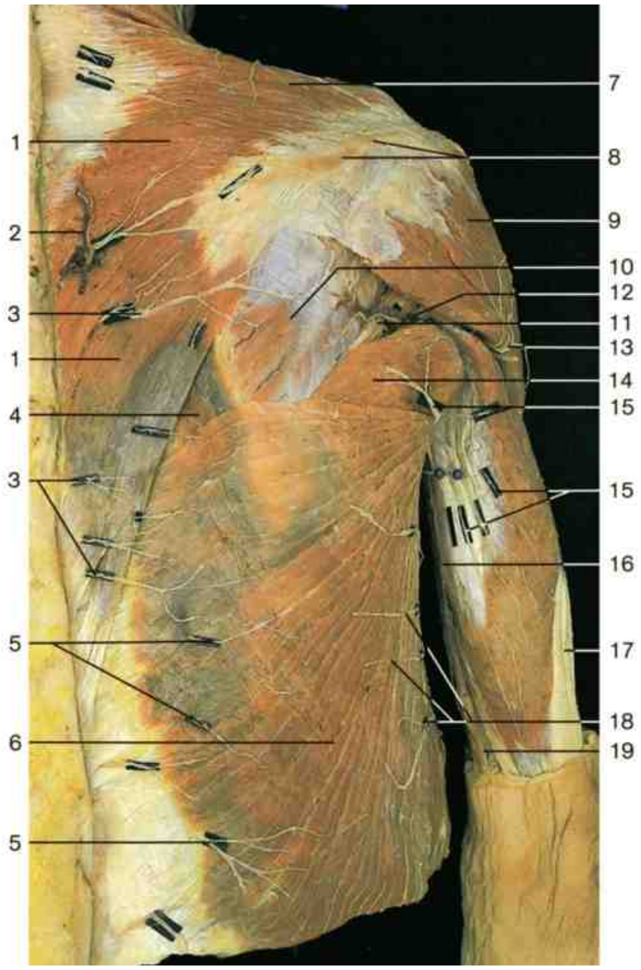


Right shoulder and thoracic wall with axillary region**,** deep layer (anterior aspect). The pectoralis major muscle has been cut and partly removed.

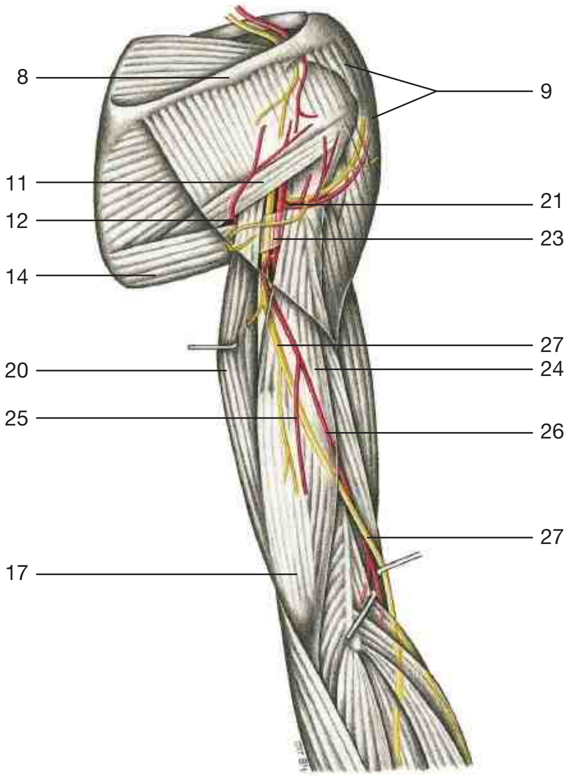
1 Accessory nerve
2 Trapezius muscle
3 Pectoralis major muscle (clavicular part)
4 Acromial branch of thoraco-acromial artery
5 Pectoralis major muscle
6 Lateral pectoral nerves
7 Abdominal part of pectoralis major muscle
8 External jugular vein
9 Cutaneous branches of cervical plexus
10 Sternocleidomastoid muscle
11 Clavicle
12 Clavipectoral fascia
13 Cephalic vein
14 Subclavius muscle
15 Clavicular branch of thoraco-acromial artery
16 Subclavian vein
17 Thoraco-acromial artery
18 Pectoral branch of thoraco-acromial artery
19 Medial pectoral nerve
20 Second rib
21 Pectoralis minor muscle
22 Third rib
23 Deltoid muscle
24 Pectoralis major muscle (reflected), brachial artery, and median nerve
25 Short head of biceps brachii muscle
26 Thoracodorsal artery and nerve
27 Medial cutaneous nerve of arm
28 Intercostobrachial nerve (T_2)
29 Long head of biceps brachii muscle
30 Medial cutaneous nerve of forearm
31 Latissimus dorsi muscle
32 Lateral cutaneous branches of intercostal nerves (posterior branches)
33 Serratus anterior muscle
34 Medial pectoral nerve
35 Long thoracic nerve and lateral thoracic artery
36 Intercostobrachial nerve (T_3)
37 Lateral cutaneous branches of intercostal nerves (anterior branches)



Shoulder and arm (dorsal aspect). Dissection of the quadrangular and triangular spaces of the axillary region.

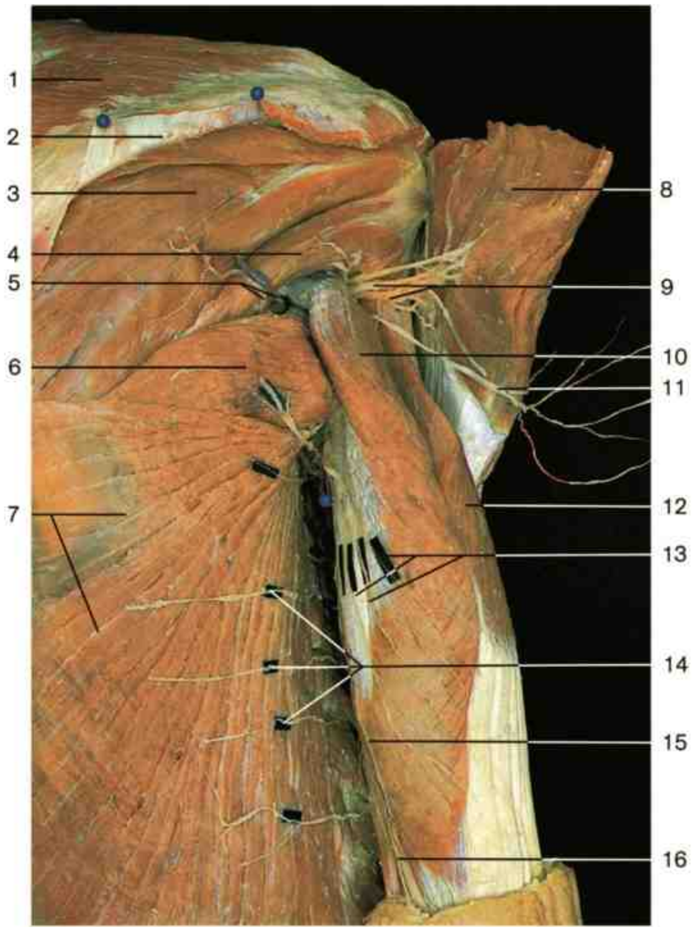


Posterior region of shoulder and arm, superficial layer. Note the segmental arrangement of the cutaneous nerves of the back.

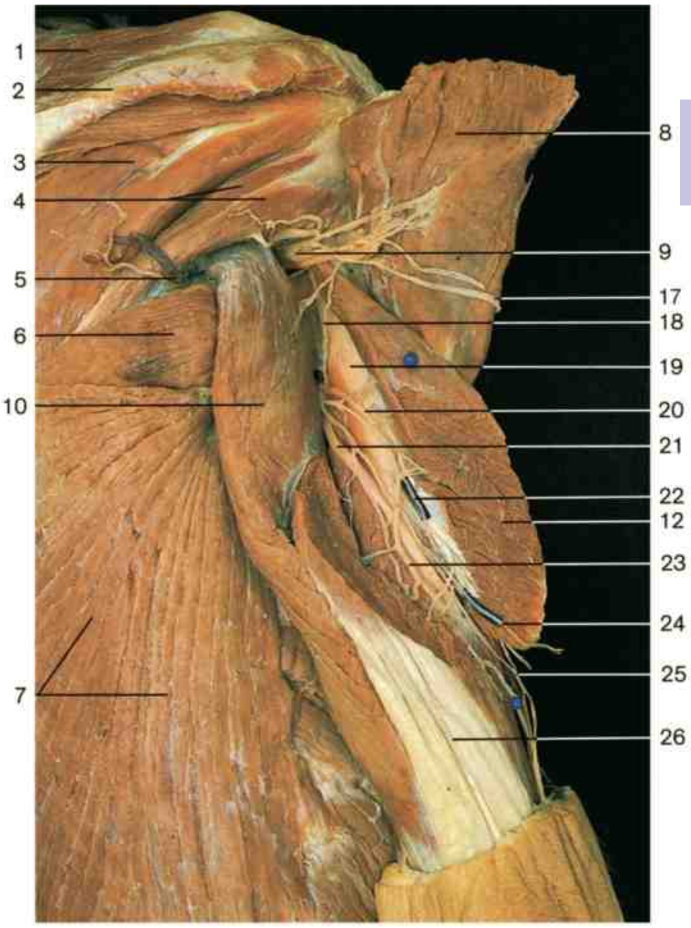


Regional anatomy of the upper limb (dorsal aspect). Localization of vessels and nerves.

1 Trapezius muscle
2 Dorsal branches of posterior intercostal artery and vein (medial cutaneous branches)
3 Medial branches of dorsal rami of spinal nerves
4 Rhomboid major muscle
5 Lateral branches of dorsal rami of spinal nerves
6 Latissimus dorsi muscle
7 Posterior supraclavicular nerves
8 Spine of scapula
9 Deltoid muscle
10 Infraspinatus muscle
11 Teres minor muscle
12 Triangular space with circumflex scapular artery and vein
13 Upper lateral cutaneous nerve of arm with artery
14 Teres major muscle
15 Terminal branches of intercostobrachial nerve
16 Medial cutaneous nerve of arm
17 Tendon of triceps brachii muscle
18 Lateral cutaneous branches of intercostal nerves
19 Medial cutaneous nerve of forearm
20 Long head of triceps brachii muscle
21 Quadrangular space with axillary nerve and posterior humeral circumflex artery
22 Anastomosis between profunda brachii artery and posterior humeral circumflex artery
23 Course of radial nerve and profunda brachii artery
24 Lateral head of triceps brachii muscle
25 Medial collateral artery
26 Radial collateral artery
27 Radial nerve

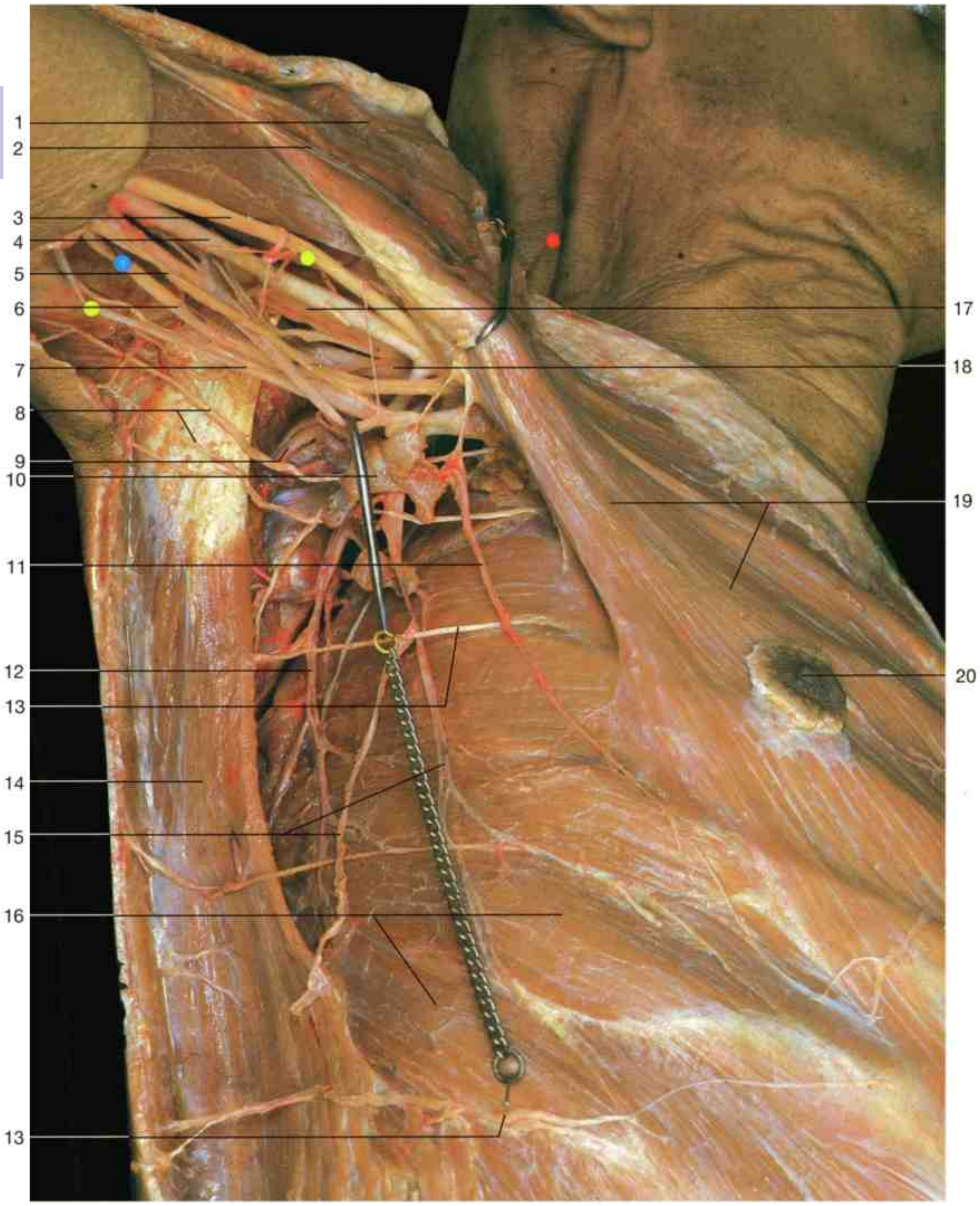


Scapular region, arm and shoulder, deep layer (dorsal aspect). Part of deltoid muscle has been cut and reflected to display the quadrangular and triangular spaces of the axillary region.



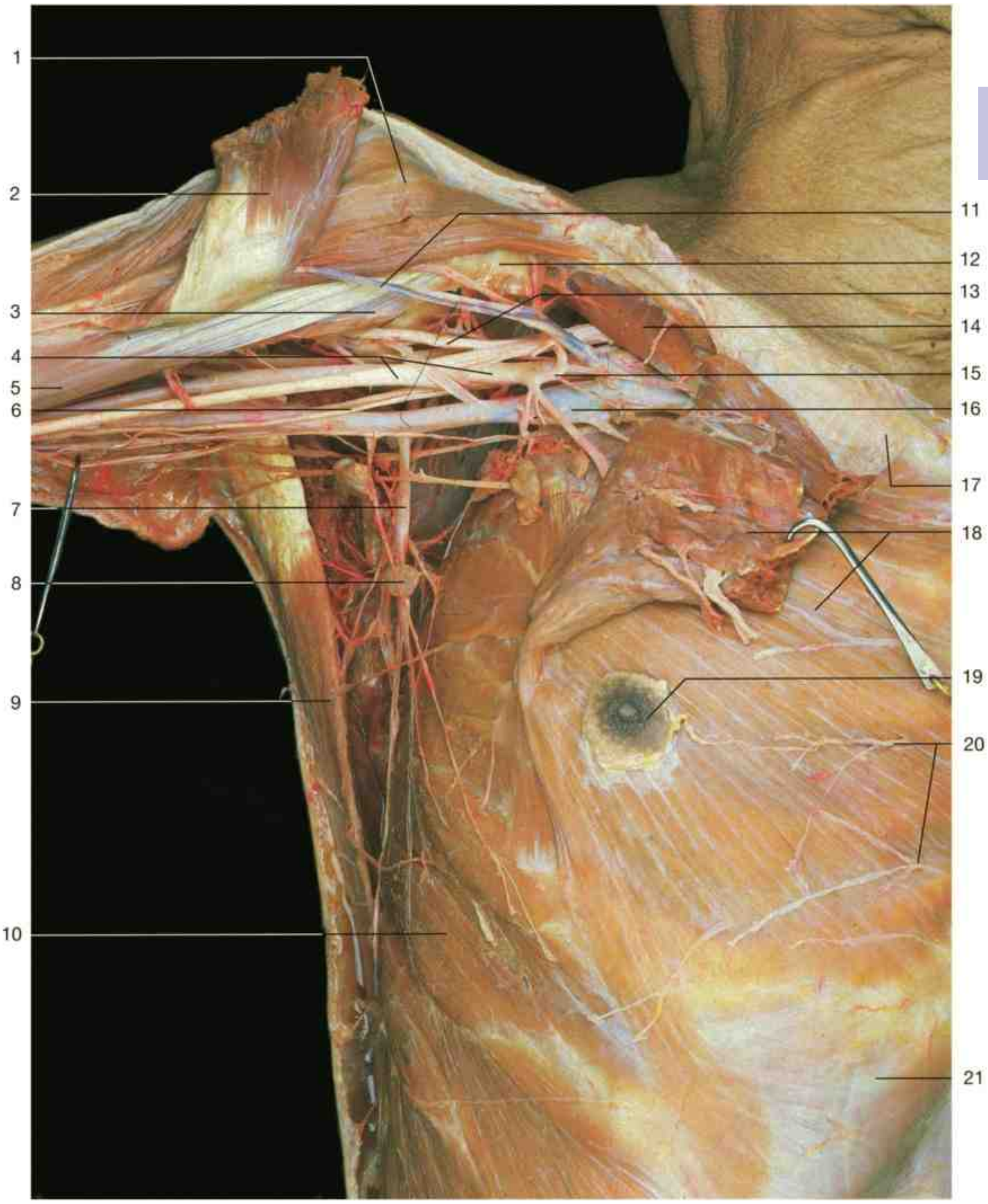
Scapular region, arm and shoulder, deep layer (dorsal aspect). The lateral head of the triceps brachii muscle has been cut to display the radial nerve and accompanying vessels.

1 Trapezius muscle
2 Spine of scapula
3 Infraspinatus muscle
4 Teres minor muscle
5 Triangular space containing circumflex scapular artery and vein
6 Teres major muscle
7 Latissimus dorsi muscle
8 Deltoid muscle (cut and reflected)
9 Quadrangular space containing axillary nerve and posterior circumflex humeral artery and vein
10 Long head of triceps brachii muscle
11 Cutaneous branch of axillary nerve
12 Lateral head of triceps brachii muscle
13 Terminal branches of intercostobrachial nerve
14 Lateral cutaneous branches of intercostal nerves
15 Medial cutaneous nerve of arm
16 Medial cutaneous nerve of forearm
17 Upper lateral cutaneous nerve of arm
18 Anastomosis between profunda brachii artery and posterior humeral circumflex artery
19 Humerus
20 Profunda brachii artery
21 Radial nerve
22 Radial collateral artery
23 Middle collateral artery
24 Lower lateral cutaneous nerve of arm
25 Posterior cutaneous nerve of forearm
26 Tendon of triceps brachii muscle



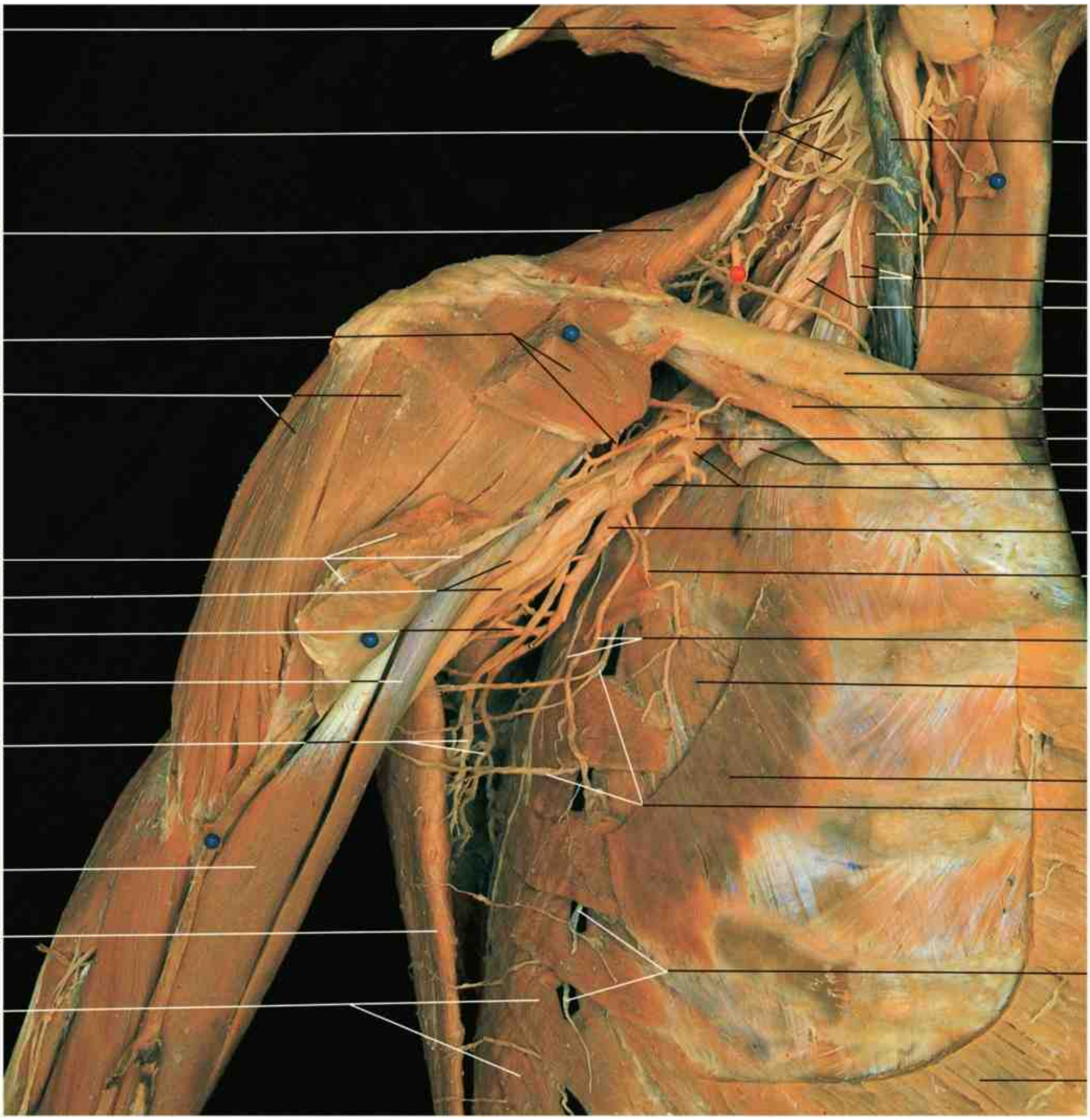
Right axillary region (inferior aspect). **Dissection of superficial axillary nodes and lymphatic vessels.** The pectoralis major muscle has been slightly elevated.

1	Deltoid muscle	11	Lateral thoracic artery
2	Cephalic vein	12	Thoracodorsal artery
3	Median nerve	13	Lateral cutaneous branch of intercostal nerve
4	Brachial artery	14	Latissimus dorsi muscle
5	Medial cutaneous nerves of arm and forearm	15	Thoraco-epigastric vein
6	Ulnar nerve	16	Serratus anterior muscle
7	Basilic vein	17	Musculocutaneous nerve
8	Intercostobrachial nerves	18	Radial nerve
9	Circumflex scapular artery	19	Pectoralis major muscle
10	Superficial axillary nodes	20	Nipple



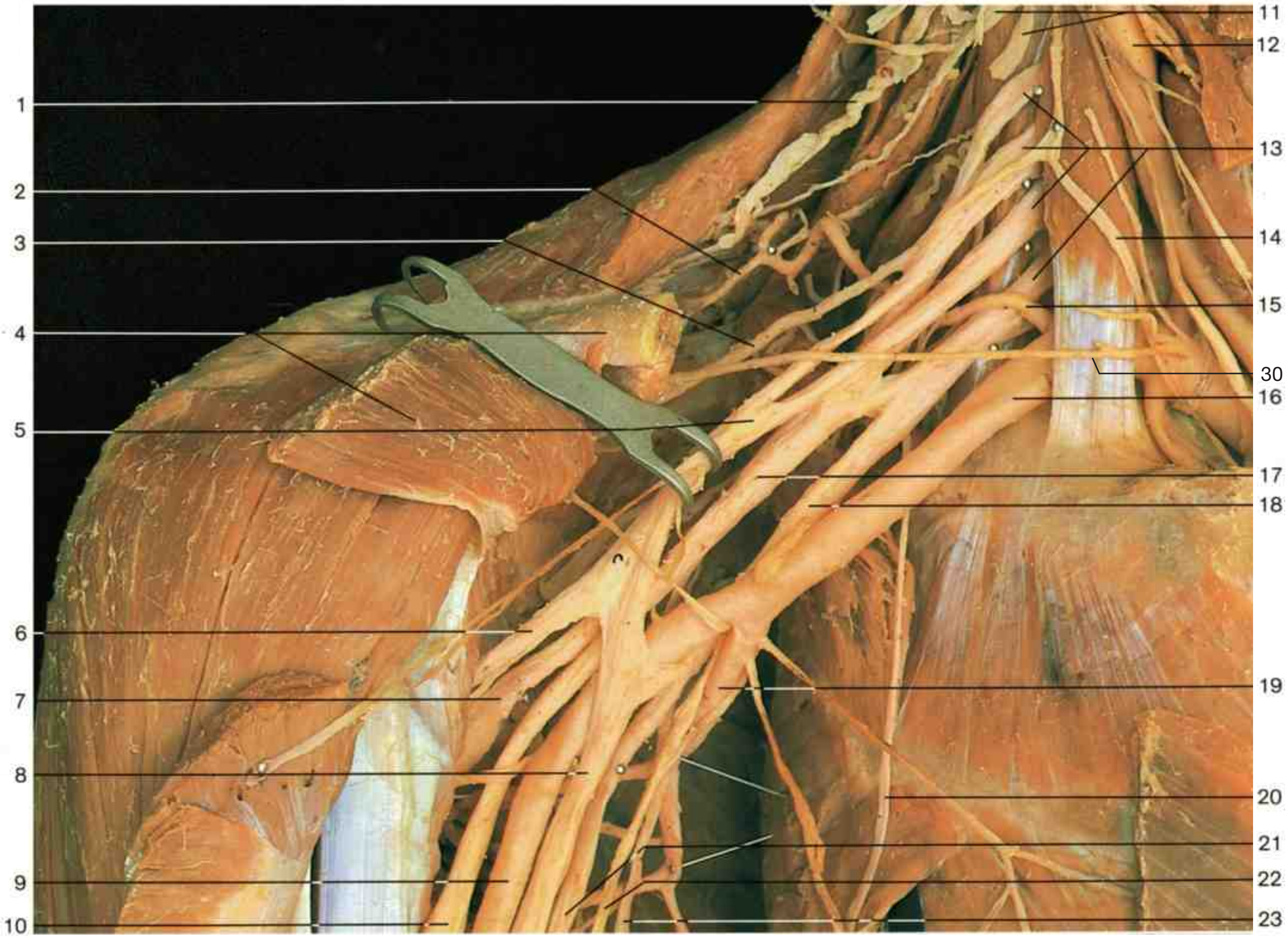
Right axillary region (anterior aspect). **Dissection of deep axillary nodes.** Pectoralis major and minor muscles divided and reflected. Shoulder girdle and arm elevated and reflected.

1	Deltoid muscle	11	Cephalic vein
2	Insertion of pectoralis major muscle	12	Insertion of pectoralis minor muscle (coracoid process)
3	Coracobrachialis muscle	13	Musculocutaneous nerve
4	Roots of median nerve, axillary artery	14	Subclavius muscle
5	Short head of biceps brachii muscle	15	Thoraco-acromial artery
6	Ulnar nerve and medial cutaneous nerve of forearm	16	Axillary vein
7	Thoraco-epigastric vein	17	Clavicle
8	Deep axillary node	18	Pectoralis major and minor muscles (reflected)
9	Latissimus dorsi muscle	19	Nipple
10	Serratus anterior muscle	20	Anterior cutaneous branches of intercostal nerves
		21	Anterior layer of rectus sheath

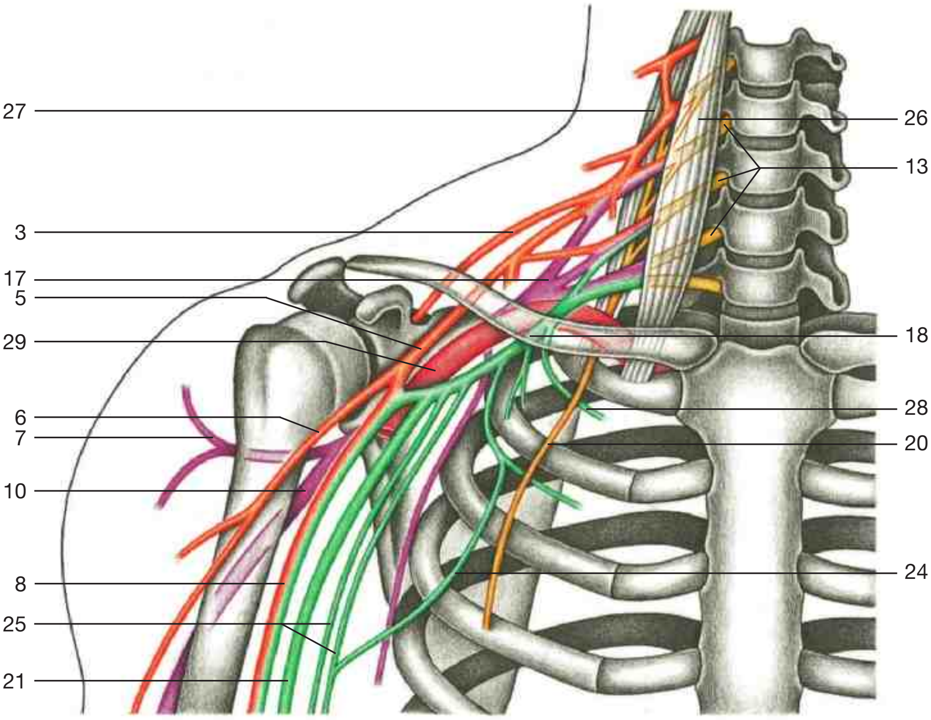


Right axillary region (anterior aspect). The pectoralis major and minor muscles have been cut and reflected to display the vessels and nerves of the axilla.

1 Sternocleidomastoid muscle (cut and reflected)
2 Cervical plexus
3 Trapezius muscle
4 Pectoralis minor muscle and medial pectoral nerve
5 Deltoid muscle
6 Pectoralis major muscle and lateral pectoral nerve
7 Median nerve and brachial artery
8 Circumflex scapular artery
9 Short head of biceps brachii muscle
10 Thoracodorsal artery and nerve
11 Long head of biceps brachii muscle
12 Latissimus dorsi muscle
13 Serratus anterior muscle
14 Internal jugular vein
15 Scalenus anterior muscle
16 Phrenic nerve and ascending cervical artery
17 Brachial plexus (at the levels of the trunks)
18 Clavicle
19 Subclavius muscle
20 Thoraco-acromial artery
21 Subclavian vein (cut)
22 Axillary artery
23 Subscapular artery
24 Superior thoracic artery
25 Lateral thoracic artery and long thoracic nerve
26 External intercostal muscle
27 Insertion of pectoralis minor muscle
28 Intercostobrachial nerves
29 Lateral cutaneous branches of intercostal nerves
30 Insertion of pectoralis major muscle

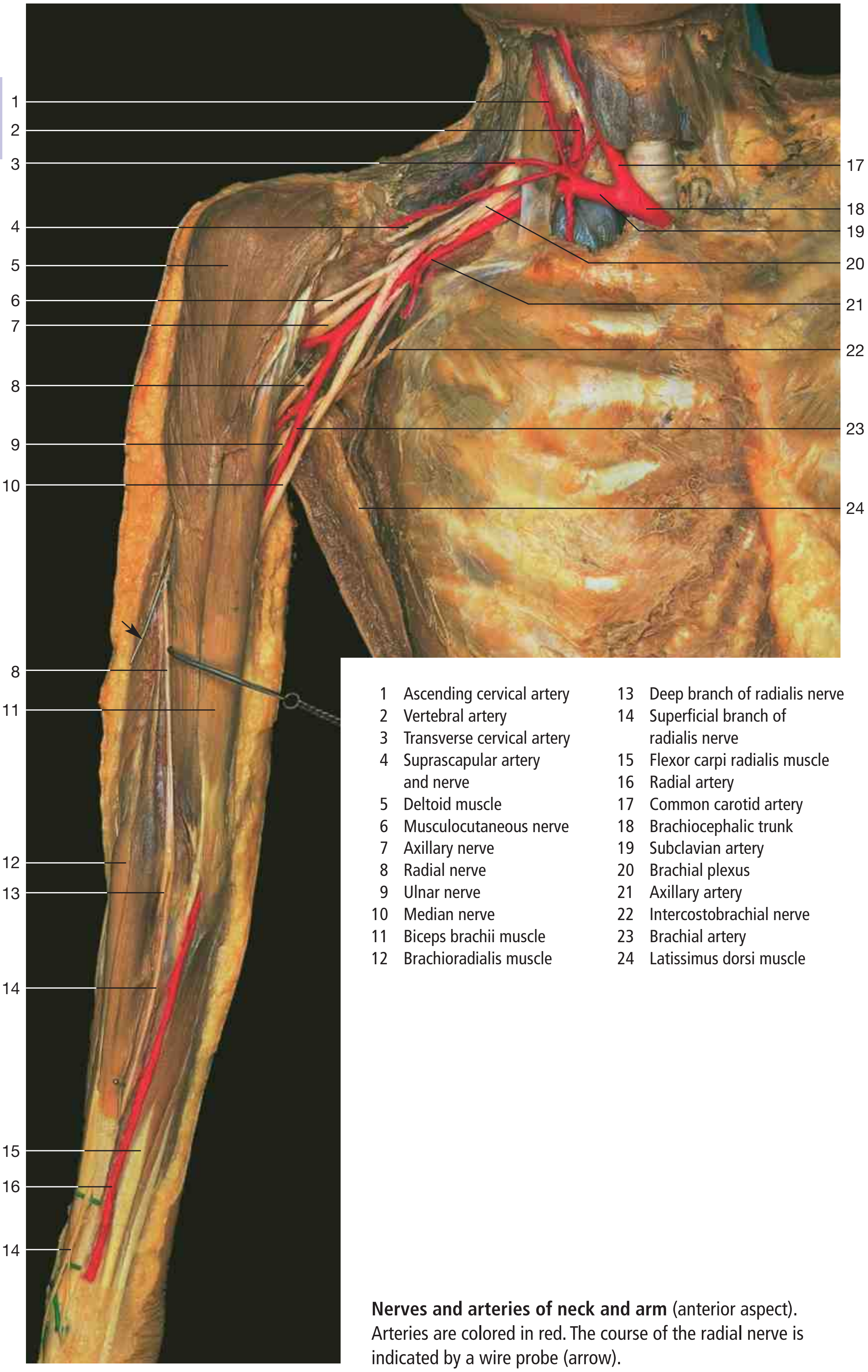


Brachial plexus (anterior aspect). Clavicle and the two pectoralis muscles have been partly removed.



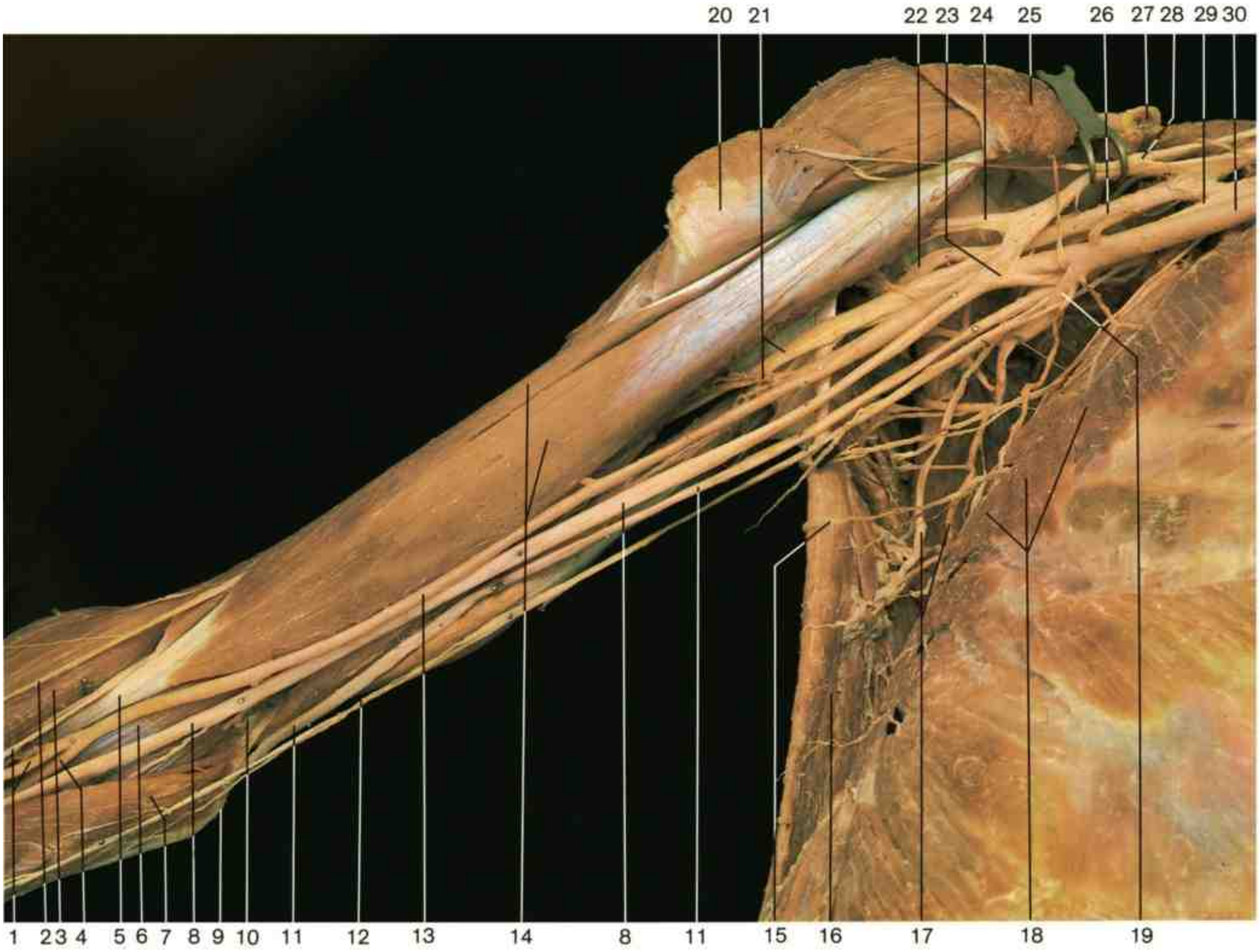
Main branches of brachial plexus. Posterior cord in purple, lateral cord in orange, and medial cord in green (schematic drawing).

1	Accessory nerve
2	Dorsal scapular artery
3	Suprascapular nerve
4	Clavicle and pectoralis minor muscle
5	Lateral cord of brachial plexus
6	Musculocutaneous nerve
7	Axillary nerve
8	Median nerve
9	Brachial artery
10	Radial nerve
11	Cervical plexus
12	Common carotid artery
13	Roots of brachial plexus (C_5–T_1)
14	Phrenic nerve
15	Transverse cervical artery
16	Subclavian artery
17	Posterior cord of brachial plexus
18	Medial cord of brachial plexus
19	Subscapular artery
20	Long thoracic nerve
21	Ulnar nerve
22	Medial cutaneous nerve of forearm
23	Thoracodorsal nerve
24	Intercostobrachial nerve
25	Medial cutaneous nerves of arm and forearm
26	Scalenus anterior muscle
27	Scalenus medius muscle
28	Intercostal nerve (T_1)
29	Axillary artery
30	Suprascapular artery

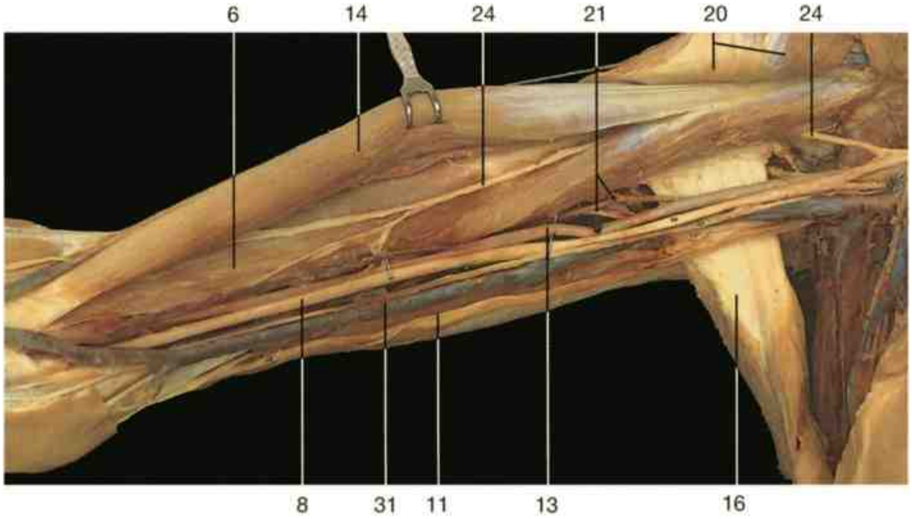


1 Ascending cervical artery
2 Vertebral artery
3 Transverse cervical artery
4 Suprascapular artery and nerve
5 Deltoid muscle
6 Musculocutaneous nerve
7 Axillary nerve
8 Radial nerve
9 Ulnar nerve
10 Median nerve
11 Biceps brachii muscle
12 Brachioradialis muscle
13 Deep branch of radialis nerve
14 Superficial branch of radialis nerve
15 Flexor carpi radialis muscle
16 Radial artery
17 Common carotid artery
18 Brachiocephalic trunk
19 Subclavian artery
20 Brachial plexus
21 Axillary artery
22 Intercostobrachial nerve
23 Brachial artery
24 Latissimus dorsi muscle

Nerves and arteries of neck and arm (anterior aspect). Arteries are colored in red. The course of the radial nerve is indicated by a wire probe (arrow).

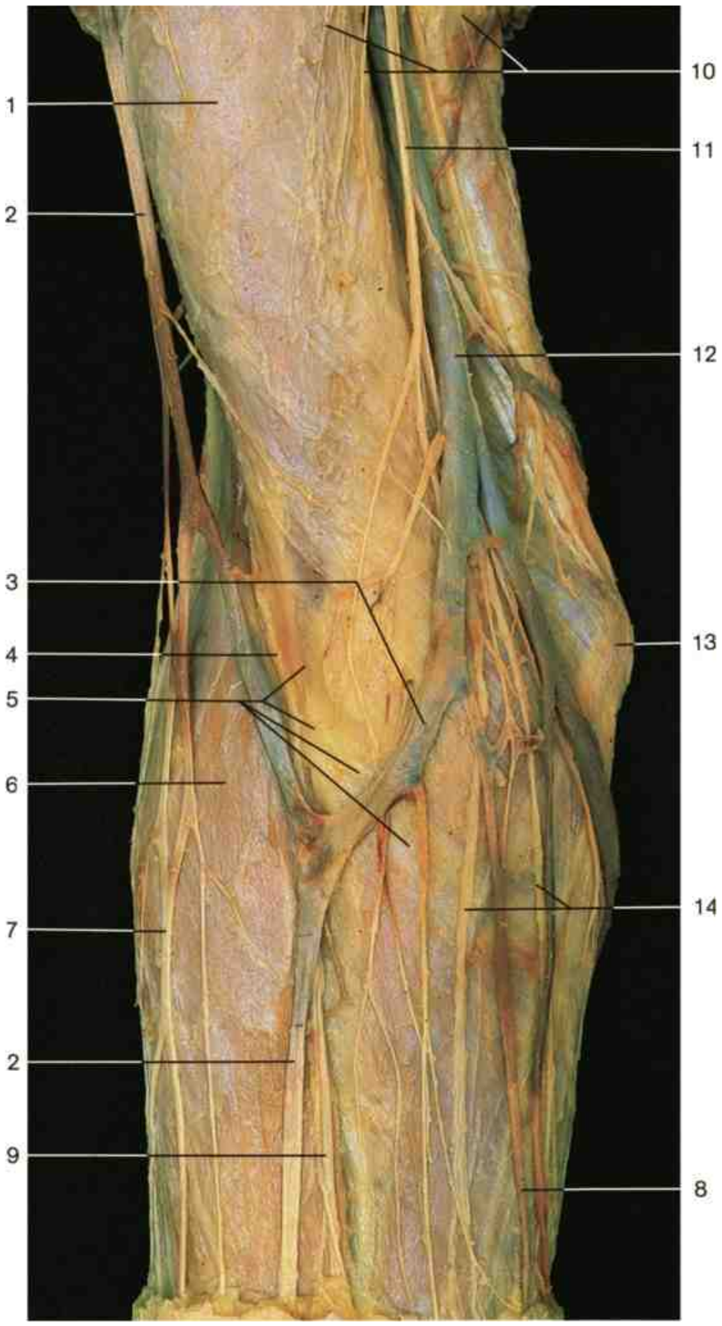


Right arm. Dissection of vessels and nerves (medial aspect). Shoulder girdle has been reflected slightly.

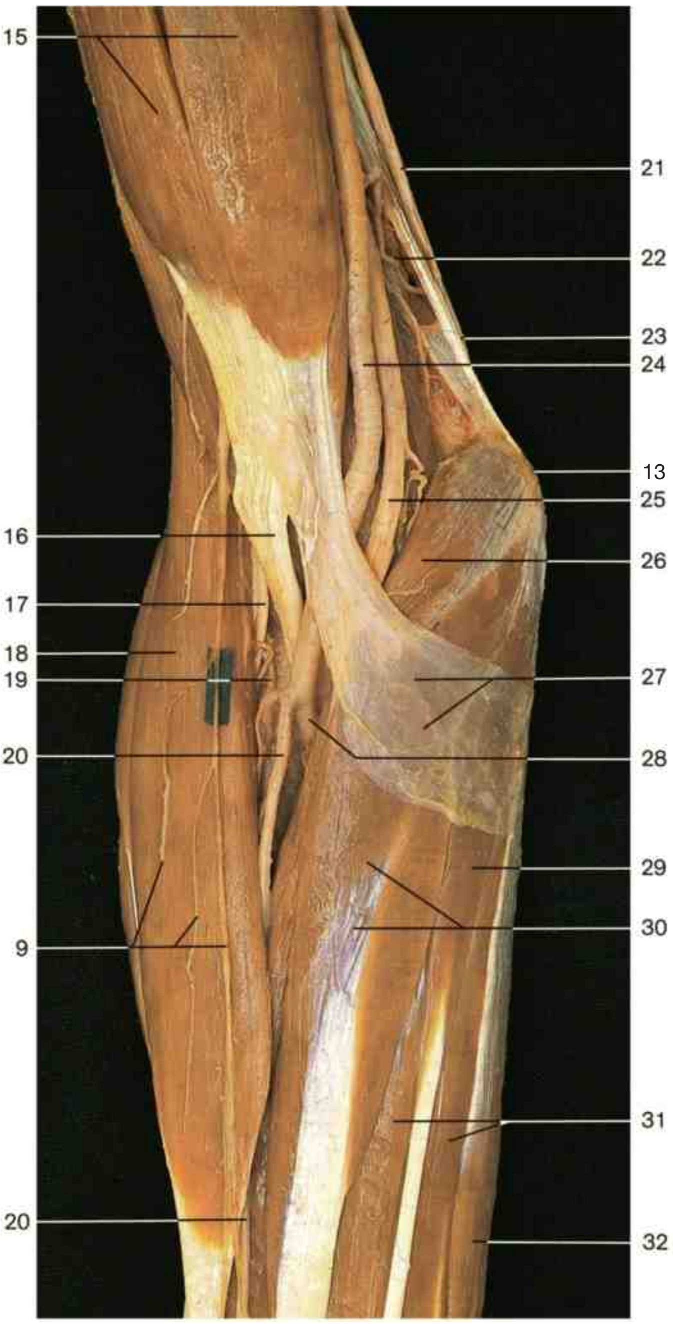


Right arm. Dissection of vessels and nerves, deeper layer. Biceps muscle has been reflected.

1 Radial artery and superficial branch of radial nerve
2 Lateral cutaneous nerve of forearm
3 Brachioradialis muscle
4 Ulnar artery
5 Tendon of biceps brachii muscle
6 Brachialis muscle
7 Pronator teres muscle
8 Median nerve
9 Medial epicondyle of humerus
10 Inferior ulnar collateral artery
11 Ulnar nerve
12 Medial cutaneous nerve of forearm
13 Brachial artery
14 Biceps brachii muscle
15 Intercostobrachial nerve (T_3)
16 Latissimus dorsi muscle
17 Thoracodorsal nerve and artery
18 Serratus anterior muscle
19 Subscapular artery
20 Pectoralis major muscle (reflected) and lateral pectoral nerve
21 Radial nerve and profunda brachii artery
22 Axillary nerve
23 Roots of the median nerve with axillary artery
24 Musculocutaneous nerve
25 Pectoralis minor muscle (reflected) and medial pectoral nerve
26 Posterior cord of brachial plexus
27 Clavicle (cut)
28 Lateral cord of brachial plexus
29 Medial cord of brachial plexus
30 Subclavian artery
31 Brachial vein

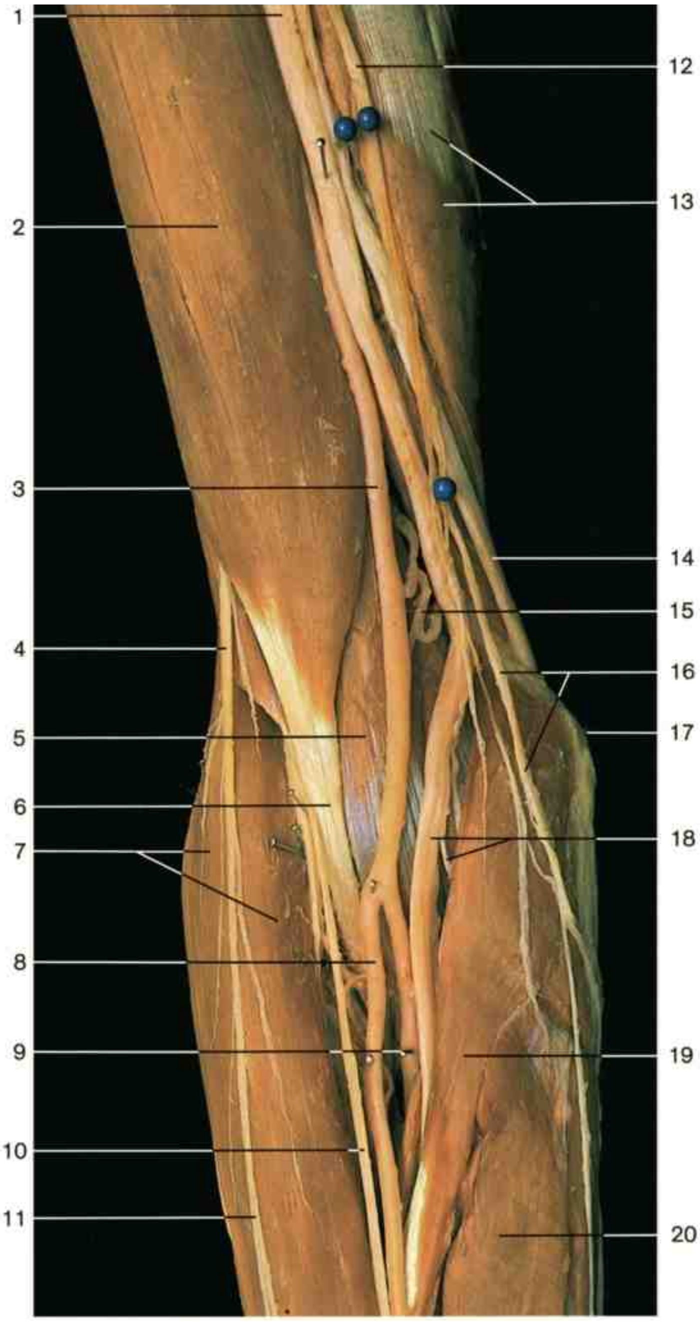


Cubital region (anterior aspect). Dissection of cutaneous nerves and veins.

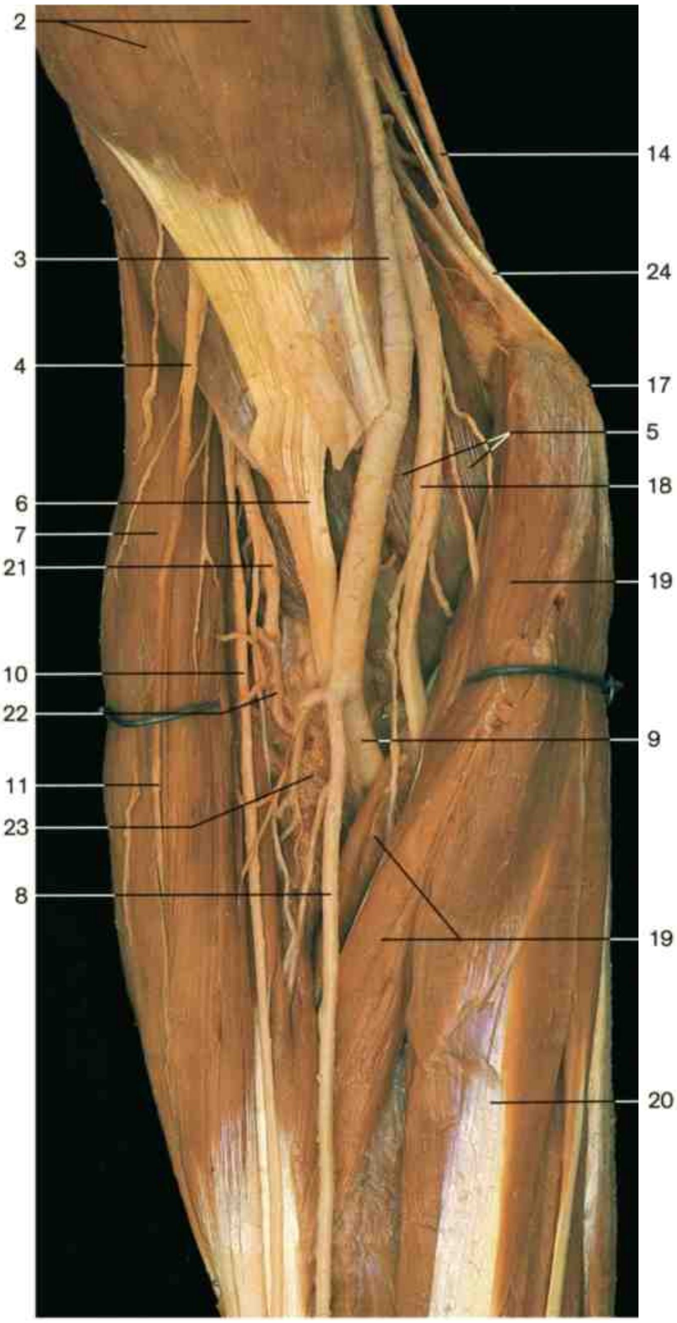


Cubital region, superficial layer (anterior aspect). The fasciae of the muscles have been removed.

1 Biceps brachii muscle with fascia
2 Cephalic vein
3 Median cubital vein
4 Lateral cutaneous nerve of forearm
5 Tendon and aponeurosis of biceps brachii muscle (covered by the antebrachial fascia)
6 Brachioradialis muscle with fascia
7 Accessory cephalic vein
8 Median vein of forearm
9 Branches of lateral cutaneous nerve of forearm
10 Terminal branches of medial cutaneous nerve of arm
11 Medial cutaneous nerve of forearm
12 Basilic vein
13 Medial epicondyle of humerus
14 Terminal branches of medial cutaneous nerve of forearm
15 Biceps brachii muscle
16 Tendon of biceps brachii muscle
17 Radial nerve
18 Brachioradialis muscle
19 Radial recurrent artery
20 Radial artery
21 Ulnar nerve
22 Superior ulnar collateral artery
23 Medial intermuscular septum
24 Brachial artery
25 Median nerve
26 Pronator teres muscle
27 Bicipital aponeurosis
28 Ulnar artery
29 Palmaris longus muscle
30 Flexor carpi radialis muscle
31 Flexor digitorum superficialis muscle
32 Flexor carpi ulnaris muscle

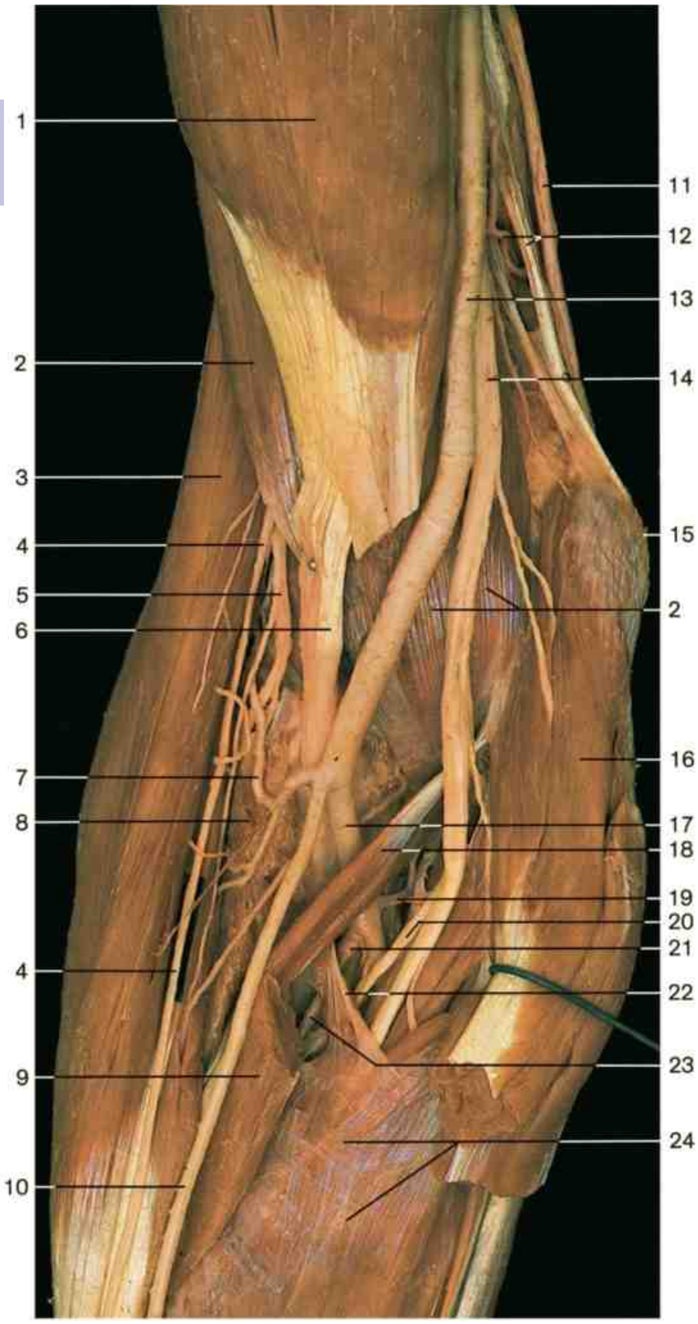


Cubital region, middle layer (anterior aspect). The bicipital aponeurosis has been removed.

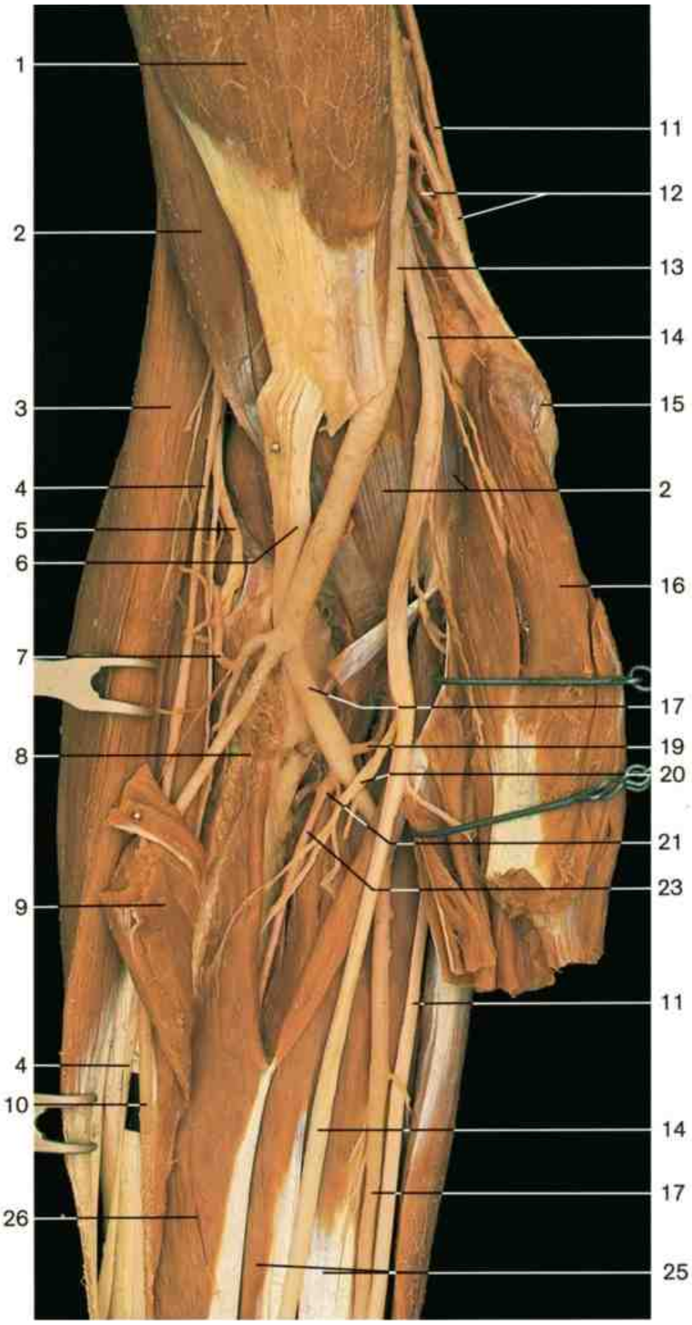


Cubital region, middle layer (anterior aspect). The pronator teres and brachioradialis muscles have been slightly reflected.

1	Median nerve
2	Biceps brachii muscle
3	Brachial artery
4	Lateral cutaneous nerve of forearm (terminal branch of musculocutaneous nerve)
5	Brachialis muscle
6	Tendon of biceps brachii muscle
7	Brachioradialis muscle
8	Radial artery
9	Ulnar artery
10	Superficial branch of radial nerve
11	Lateral cutaneous nerve of forearm
12	Medial cutaneous nerve of forearm
13	Triceps brachii muscle
14	Ulnar nerve
15	Inferior ulnar collateral artery
16	Anterior branch of medial cutaneous nerve of forearm
17	Medial epicondyle of humerus
18	Median nerve with branches to pronator teres muscle
19	Pronator teres muscle
20	Flexor carpi radialis muscle
21	Deep branch of radial nerve
22	Radial recurrent artery
23	Supinator muscle
24	Medial intermuscular septum of arm

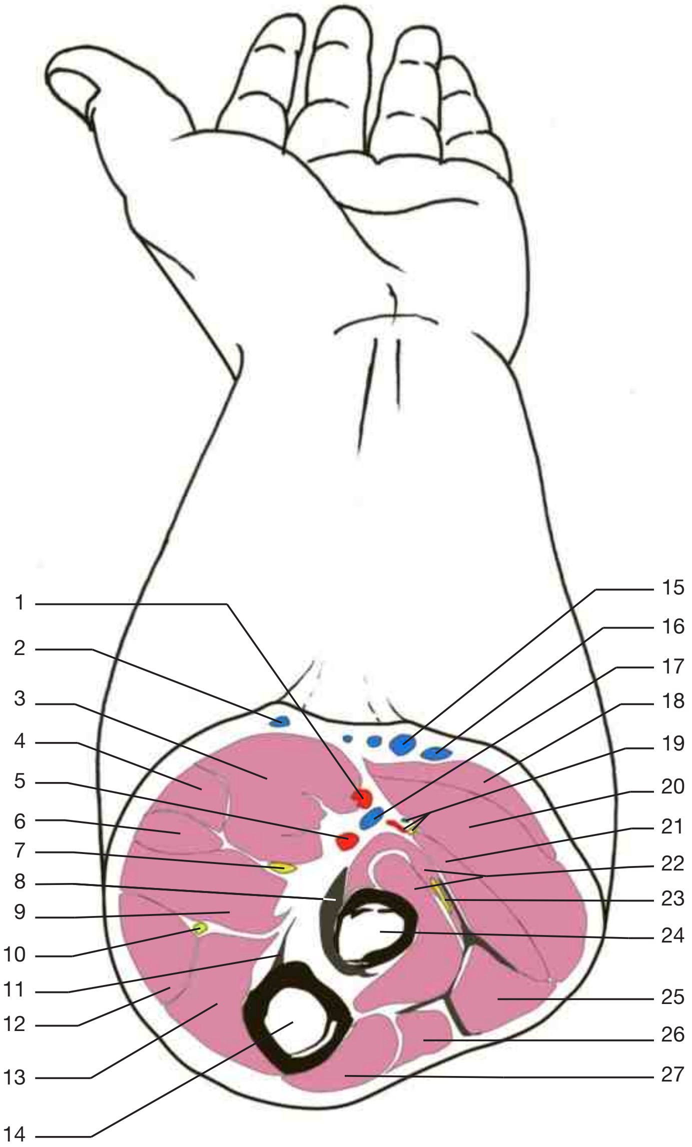


Cubital region, deep layer (anterior aspect). The pronator teres and flexor carpi ulnaris muscles have been cut and reflected.



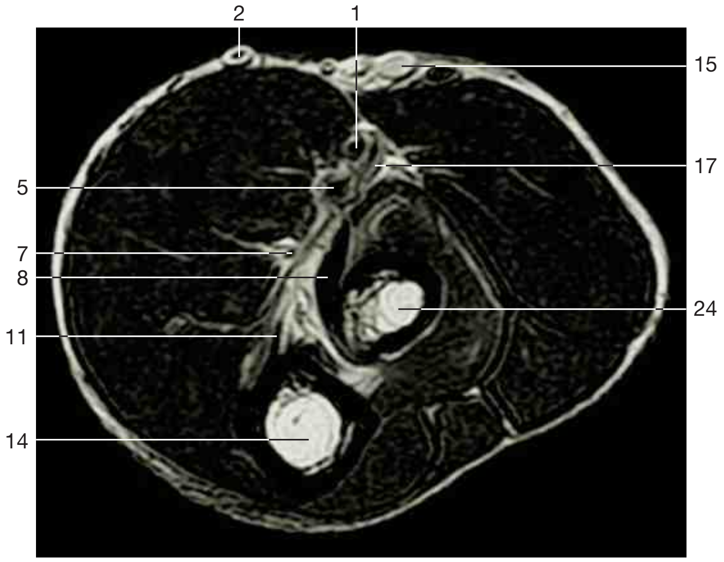
Cubital region, deepest layer (anterior aspect). The flexor digitorum superficialis muscle and the ulnar head of the pronator teres muscle have been cut and reflected.

1 Biceps brachii muscle
2 Brachialis muscle
3 Brachioradialis muscle
4 Superficial branch of radial nerve
5 Deep branch of radial nerve
6 Tendon of biceps brachii muscle
7 Radial recurrent artery
8 Supinator muscle
9 Insertion of pronator teres muscle
10 Radial artery
11 Ulnar nerve
12 Medial intermuscular septum of arm and superior ulnar collateral artery
13 Brachial artery
14 Median nerve
15 Medial epicondyle of humerus
16 Humeral head of pronator teres muscle
17 Ulnar artery
18 Ulnar head of pronator teres muscle
19 Ulnar recurrent artery
20 Anterior interosseous nerve
21 Common interosseous artery
22 Tendinous arch of flexor digitorum superficialis muscle
23 Anterior interosseous artery
24 Flexor digitorum superficialis muscle
25 Flexor digitorum profundus muscle
26 Flexor pollicis longus muscle

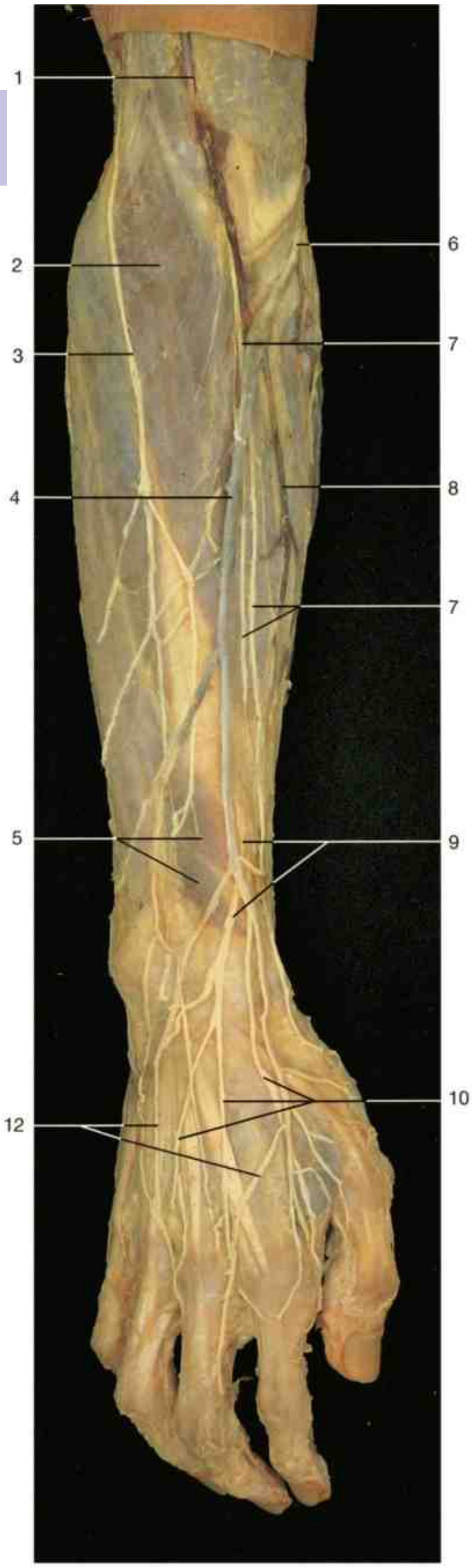


Muscles, nerves, and blood vessels of the forearm (axial section distally of the elbow joint, cf. MRI scan).

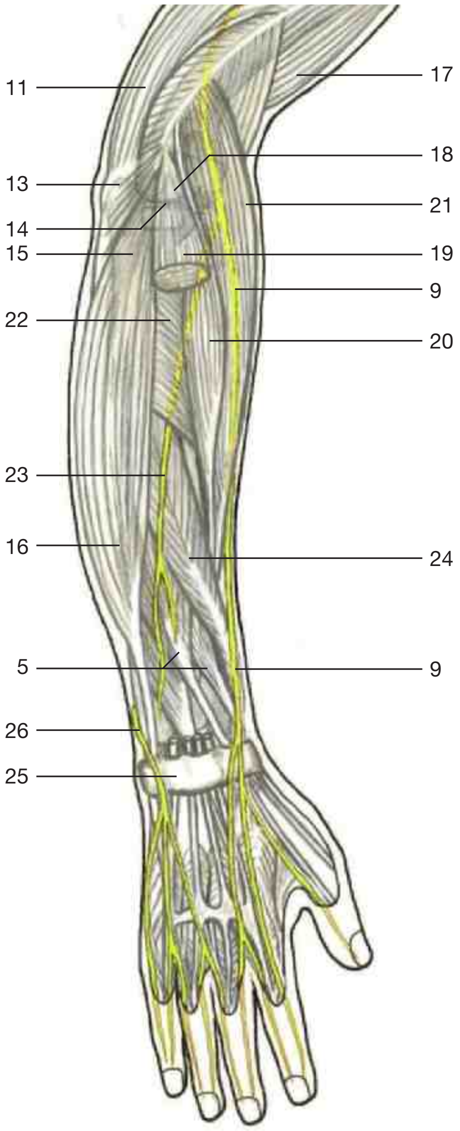
1	Radial artery
2	Basilic vein
3	Pronator teres muscle
4	Flexor carpi radialis muscle
5	Ulnar artery
6	Palmaris longus muscle
7	Median nerve
8	Tendon of biceps brachii muscle
9	Flexor digitorum superficialis muscle
10	Ulnar nerve
11	Tendon of brachialis muscle
12	Flexor carpi ulnaris muscle
13	Flexor digitorum profundus muscle
14	Ulna
15	Median cubital vein
16	Cephalic antebrachii vein
17	Radial vein
18	Brachioradialis muscle
19	Superficial branch of radial nerve, radial artery and vein
20	Extensor carpi radialis longus muscle
21	Extensor carpi radialis brevis muscle
22	Supinator muscle
23	Deep branch of radial nerve
24	Radius
25	Extensor digitorum muscle
26	Extensor carpi ulnaris muscle
27	Anconeus muscle



Axial section of the forearm (distally of the elbow joint, MRI scan; from Heuck et al., MRT-Atlas, 2009). For details see schematic drawing above.

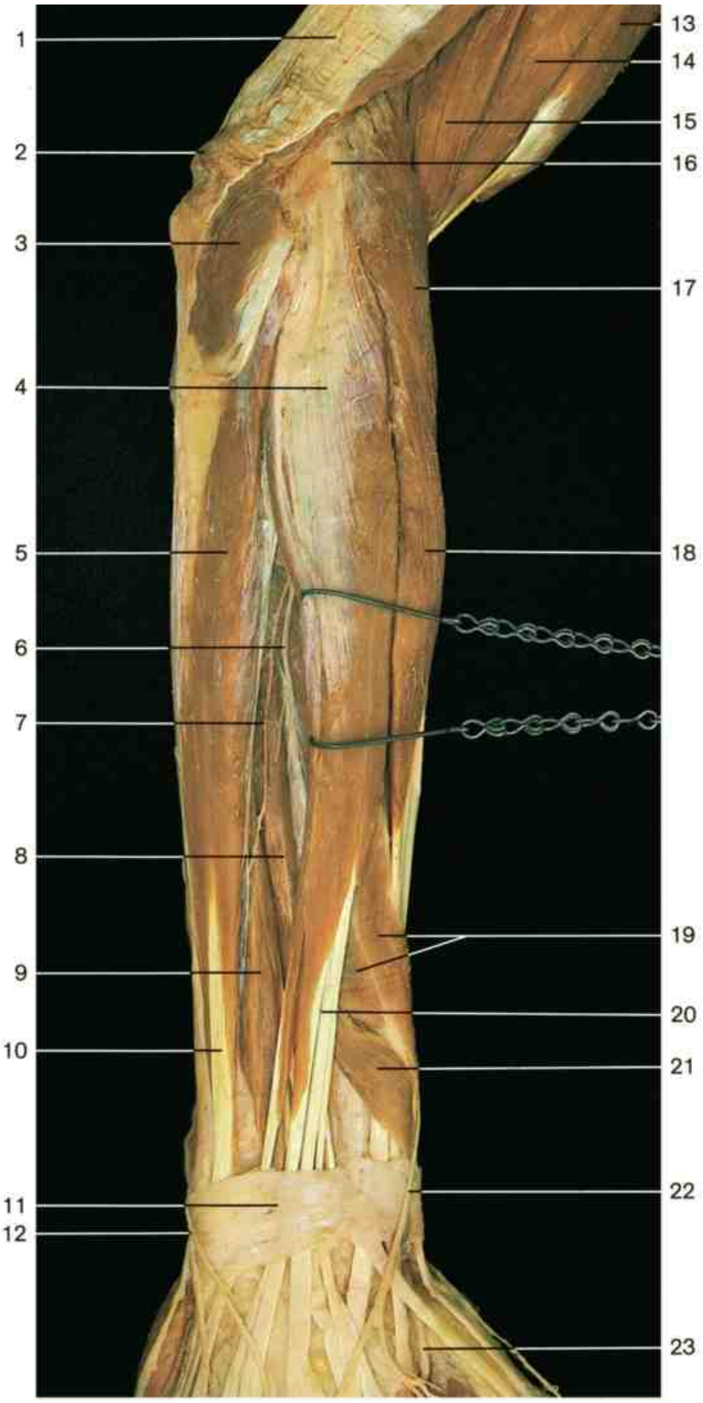


Superficial veins and cutaneous nerves of forearm and hand (posterior aspect).

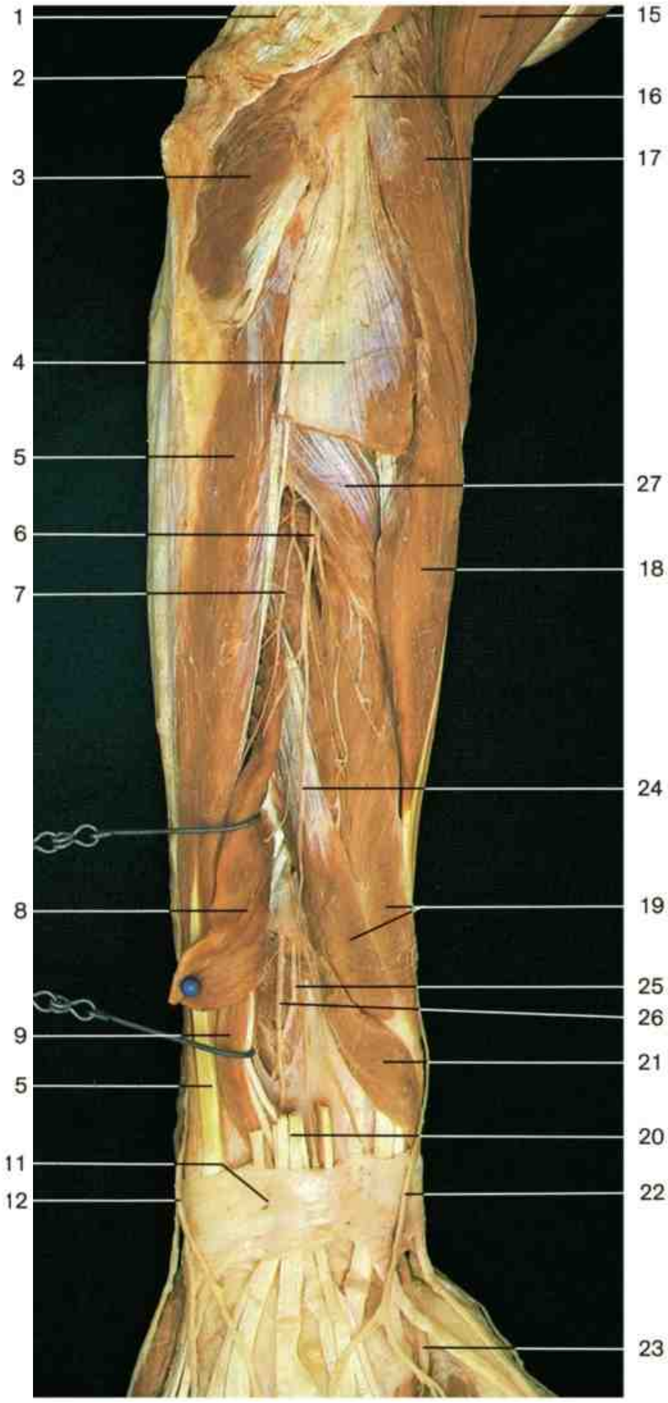


Course of the nerves to forearm and hand (posterior aspect).
Yellow = radial and ulnar nerves.

1 Cephalic vein
2 Brachioradialis muscle covered by its fascia
3 Posterior cutaneous nerve of forearm (branch of radialis nerve)
4 Cephalic vein of forearm
5 Extensor pollicis longus and brevis muscles covered by their fascia
6 Median cubital vein
7 Lateral cutaneous nerves of forearm (branch of musculocutaneous nerve)
8 Intermedian vein of forearm
9 Superficial branch of radial nerve
10 Dorsal digital branches of radial nerve
11 Triceps brachii muscle
12 Dorsal venous network of hand
13 Olecranon
14 Humeroradial joint
15 Ulna
16 Extensor carpi ulnaris muscle
17 Biceps brachii muscle
18 Trochlea of humerus
19 Extensor digitorum muscle
20 Extensor carpi radialis muscle
21 Brachioradialis muscle
22 Supinator muscle
23 Deep branch of radial nerve
24 Abductor pollicis longus muscle
25 Extensor retinaculum
26 Ulnar nerve

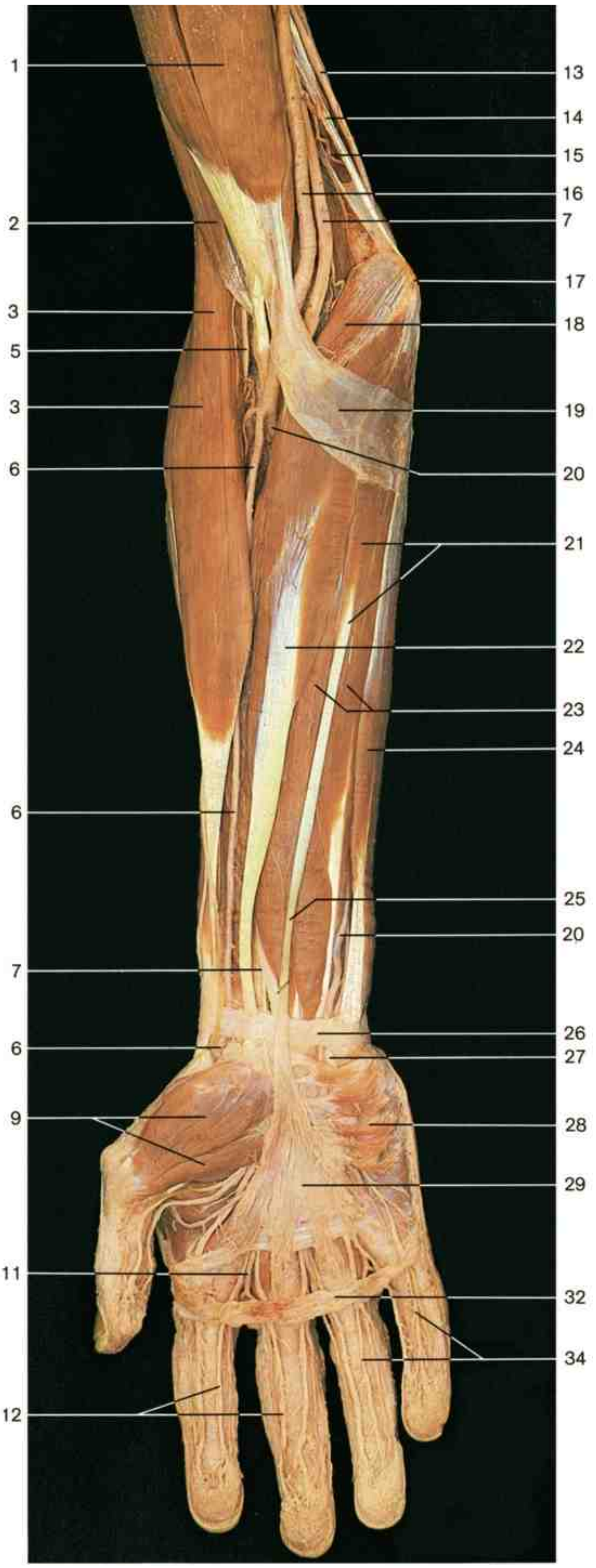


Vessels and nerves of right forearm, superficial layer (posterior aspect).



Vessels and nerves of right forearm, deep layer (posterior aspect).

1 Tendon of triceps brachii muscle
2 Olecranon
3 Anconeus muscle
4 Extensor digitorum muscle
5 Extensor carpi ulnaris muscle
6 Deep branch of radial nerve
7 Posterior interosseous artery
8 Extensor pollicis longus muscle
9 Extensor indicis muscle
10 Tendon of extensor carpi ulnaris muscle
11 Extensor retinaculum
12 Dorsal branch of ulnar nerve
13 Biceps brachii muscle
14 Brachialis muscle
15 Brachioradialis muscle
16 Lateral epicondyle of humerus
17 Extensor carpi radialis longus muscle
18 Extensor carpi radialis brevis muscle
19 Abductor pollicis longus muscle
20 Tendons of extensor digitorum muscle
21 Extensor pollicis brevis muscle
22 Superficial branch of radial nerve
23 Radial artery
24 Posterior interosseous nerve
25 Posterior interosseous branch of radial nerve
26 Posterior branch of anterior interosseous artery
27 Supinator muscle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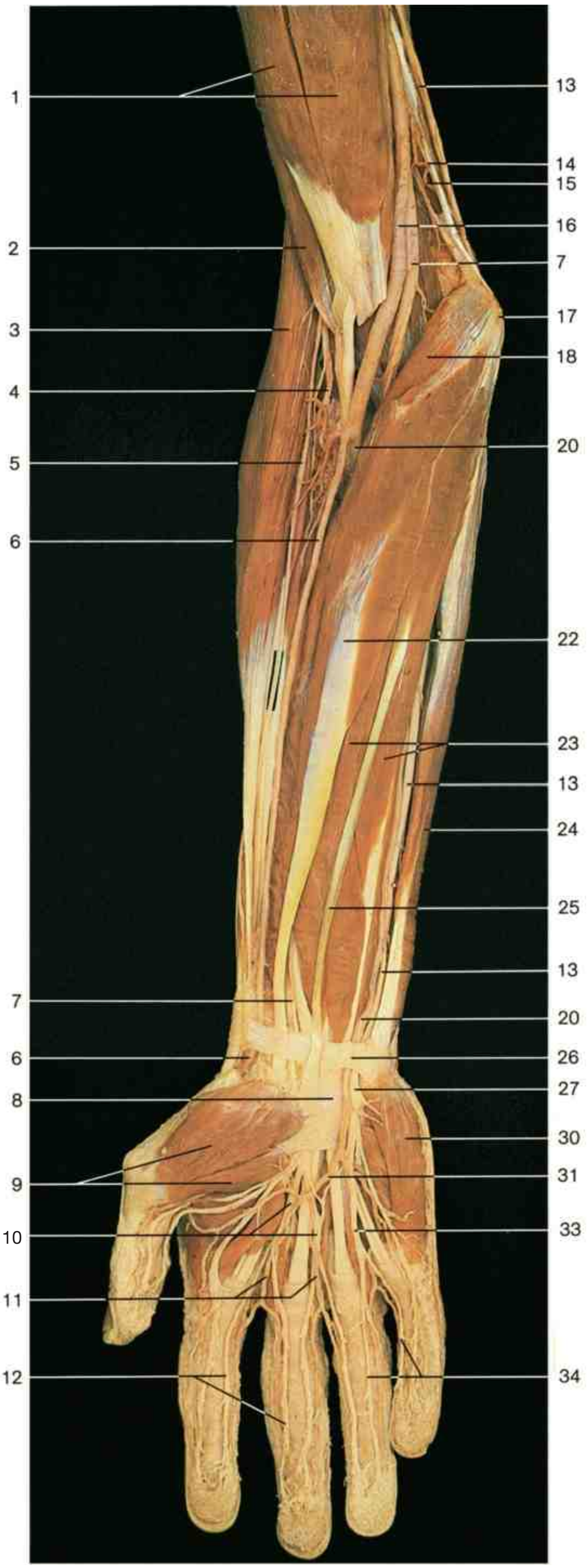
Vessels and nerves of right forearm and hand, superficial layer (palmar aspect).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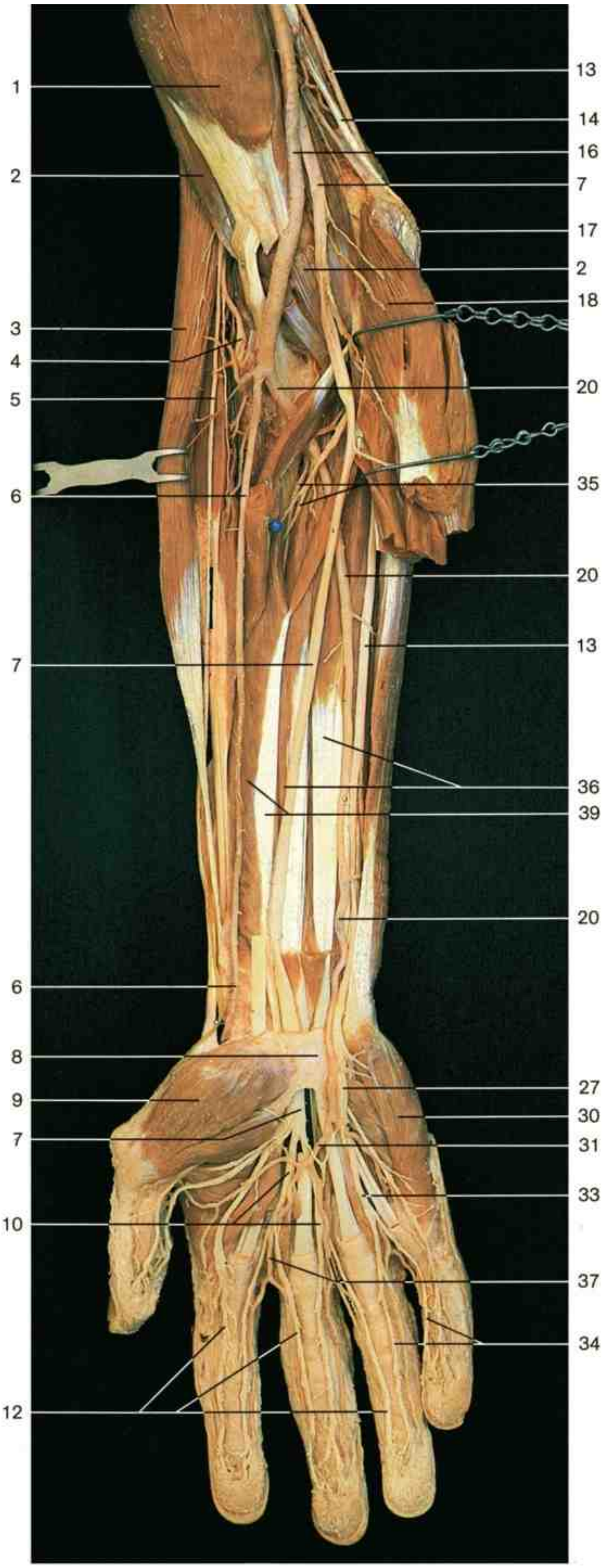
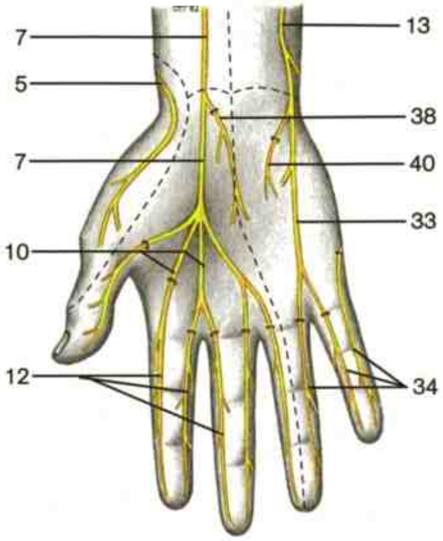
Vessels and nerves of right forearm and hand, superficial layer (palmar aspect). The palmar aponeurosis of the hand and the bicipital aponeurosis have been removed.

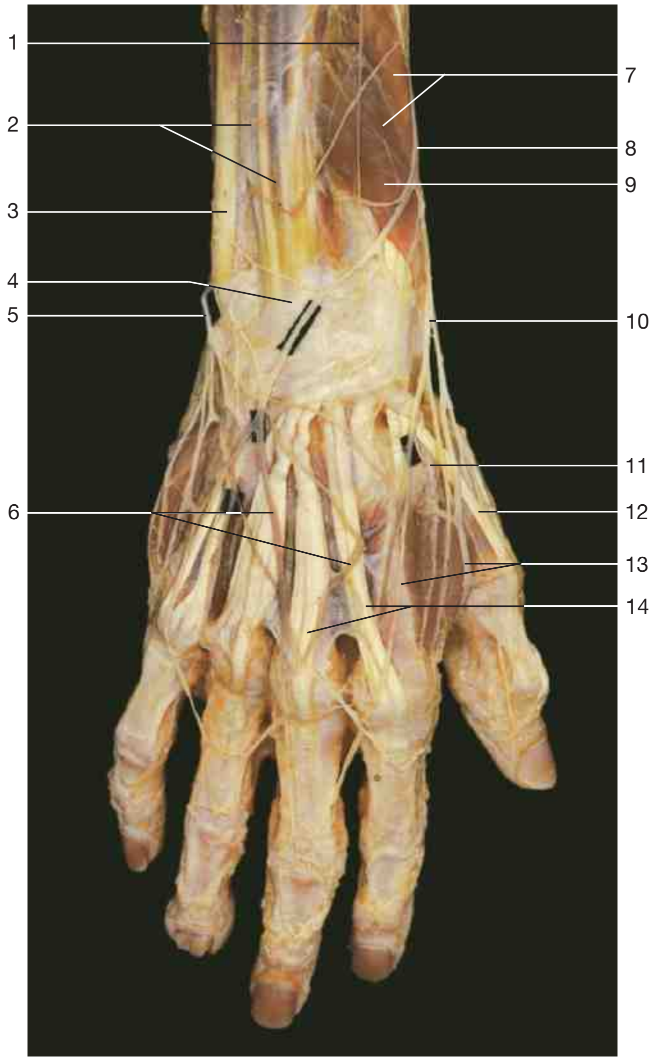


Vessels and nerves of forearm and hand, deep layer (palmar aspect). The superficial layer of the flexor muscles has been removed.

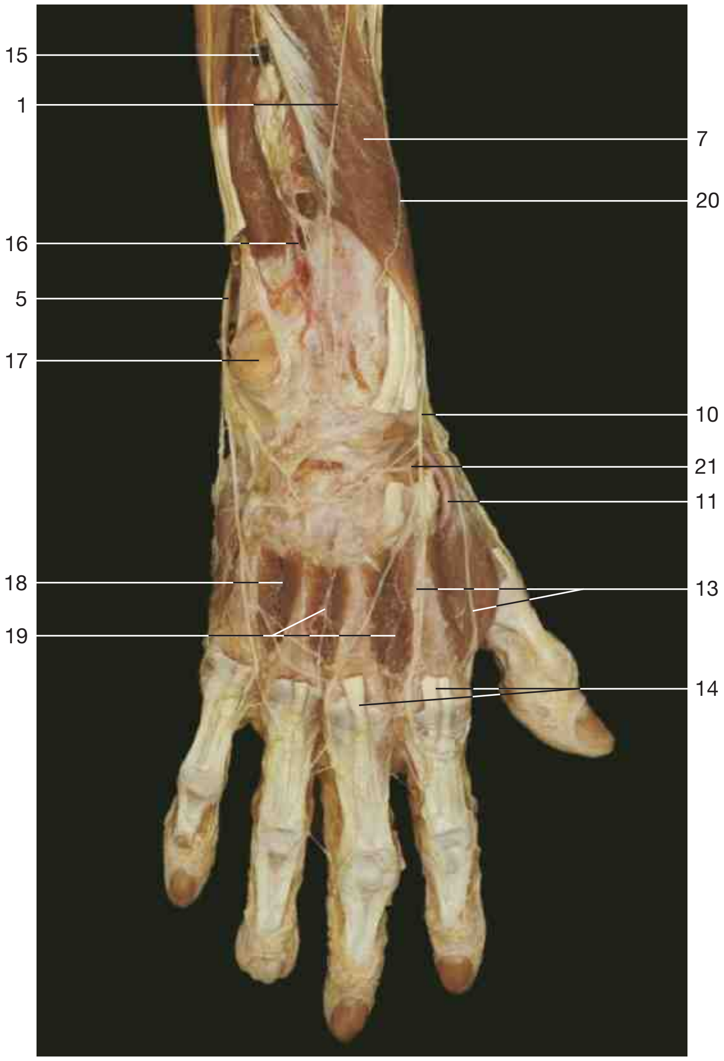
1	Biceps brachii muscle
2	Brachialis muscle
3	Brachioradialis muscle
4	Deep branch of radial nerve
5	Superficial branch of radial nerve
6	Radial artery
7	Median nerve
8	Flexor retinaculum
9	Thenar muscles
10	Common palmar digital branches of median nerve
11	Common palmar digital arteries
12	Proper palmar digital nerves (median nerve)
13	Ulnar nerve
14	Medial intermuscular septum of arm
15	Superior ulnar collateral artery
16	Brachial artery
17	Medial epicondyle of humerus
18	Pronator teres muscle
19	Bicipital aponeurosis
20	Ulnar artery
21	Palmaris longus muscle
22	Flexor carpi radialis muscle
23	Flexor digitorum superficialis muscle
24	Flexor carpi ulnaris muscle
25	Tendon of palmaris longus muscle
26	Remnant of antebrachial fascia
27	Superficial branch of ulnar nerve
28	Palmaris brevis muscle
29	Palmar aponeurosis
30	Hypothenar muscles
31	Superficial palmar arch
32	Superficial transverse metacarpal ligament
33	Common palmar digital branch of ulnar nerve
34	Proper palmar digital branches of ulnar nerve
35	Anterior interosseous artery and nerve
36	Flexor digitorum profundus muscle
37	Common palmar digital arteries
38	Palmar branch of median nerve
39	Flexor pollicis longus muscle
40	Palmar branch of ulnar nerve



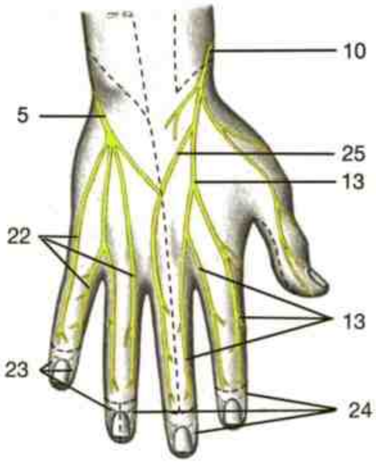
Innervation pattern of palmar surfaces of hand. 3½ digits by median nerve, 1½ digits by ulnar nerve.



Posterior region of hand (superficial layer). Cutaneous nerves and veins are depicted.

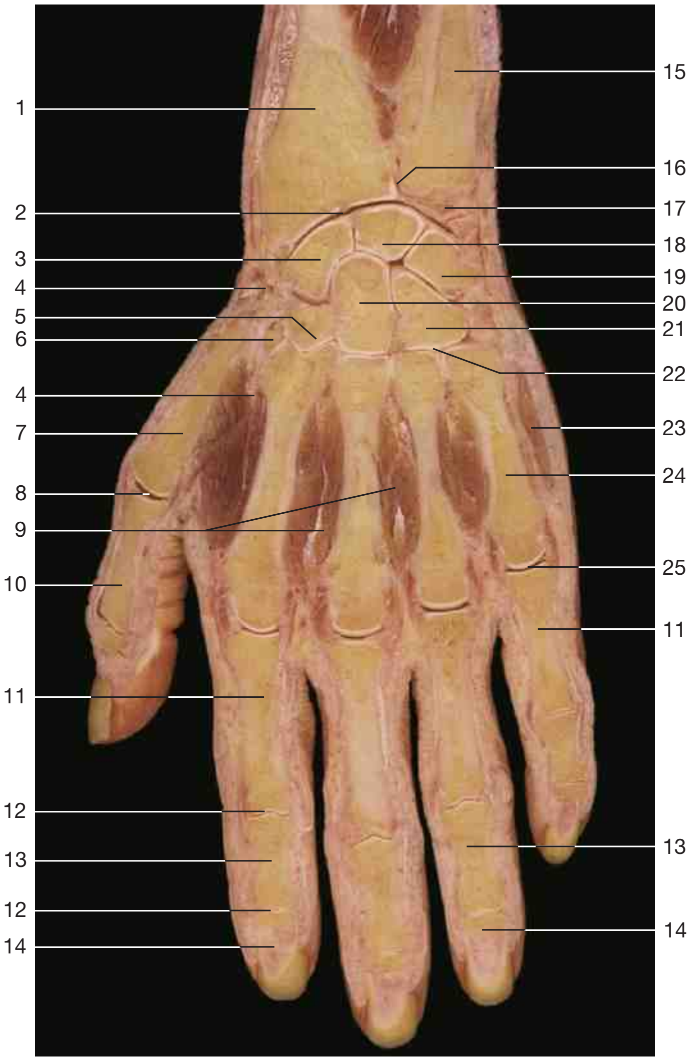


Posterior region of hand (deeper layer). Extensor digitorum muscle has been partly removed.

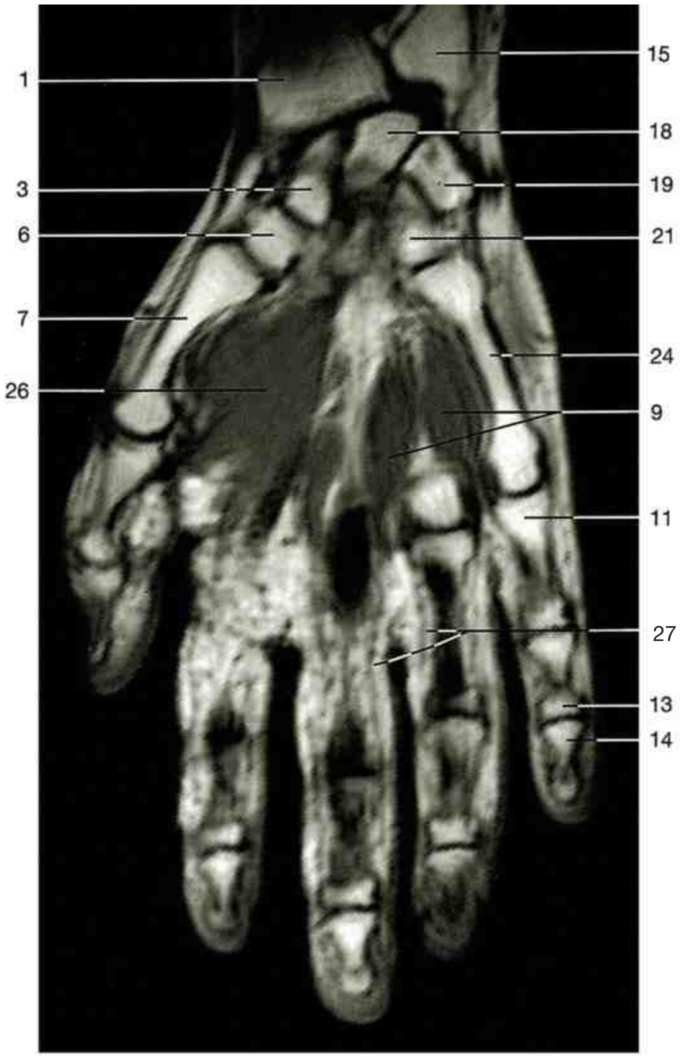


Innervation pattern of posterior surfaces of hand. $2^{1}/_{2}$ digits by radial nerve, $2^{1}/_{2}$ digits by ulnar nerve. Note that the terminal branches to the dorsal surfaces of the distal phalanges are derived from the palmar digital nerves. The cutaneous distribution varies; often $3^{1}/_{2}$ digits are innervated by the radial and $1^{1}/_{2}$ digits by the ulnar nerve.

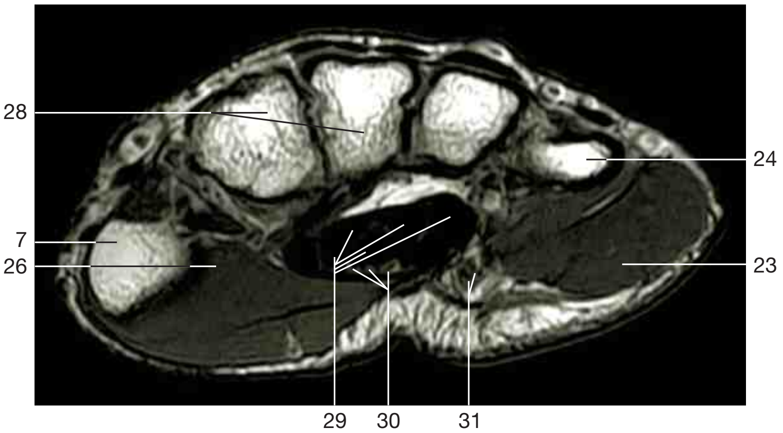
1 Posterior cutaneous nerve of forearm (branch of radial nerve)
2 Extensor digitorum muscle
3 Tendon of extensor carpi ulnaris muscle
4 Extensor retinaculum
5 Ulnar nerve
6 Dorsal venous network of hand
7 Abductor pollicis longus muscle
8 Cephalic vein
9 Extensor pollicis brevis muscle
10 Radial nerve, superficial branch
11 Radial artery
12 Tendon of extensor pollicis longus muscle
13 Dorsal digital branches of radial nerve
14 Tendons of extensor digitorum muscle with intertendinous connections
15 Posterior interosseus nerve (branch of the deep radial nerve)
16 Posterior interosseous artery
17 Styloid process of ulna
18 Dorsal interosseus muscle IV
19 Dorsal carpal branch of radial artery
20 Lateral cutaneous nerve of forearm (branch of musculocutaneous nerve)
21 Dorsal metacarpal artery
22 Proper dorsal digital branches of ulnar nerve
23 Regions supplied by palmar digital nerves (ulnar nerve)
24 Regions supplied by palmar digital nerves (median nerve)
25 Communicating branch with ulnar nerve



Coronal section through the left hand (posterior aspect).

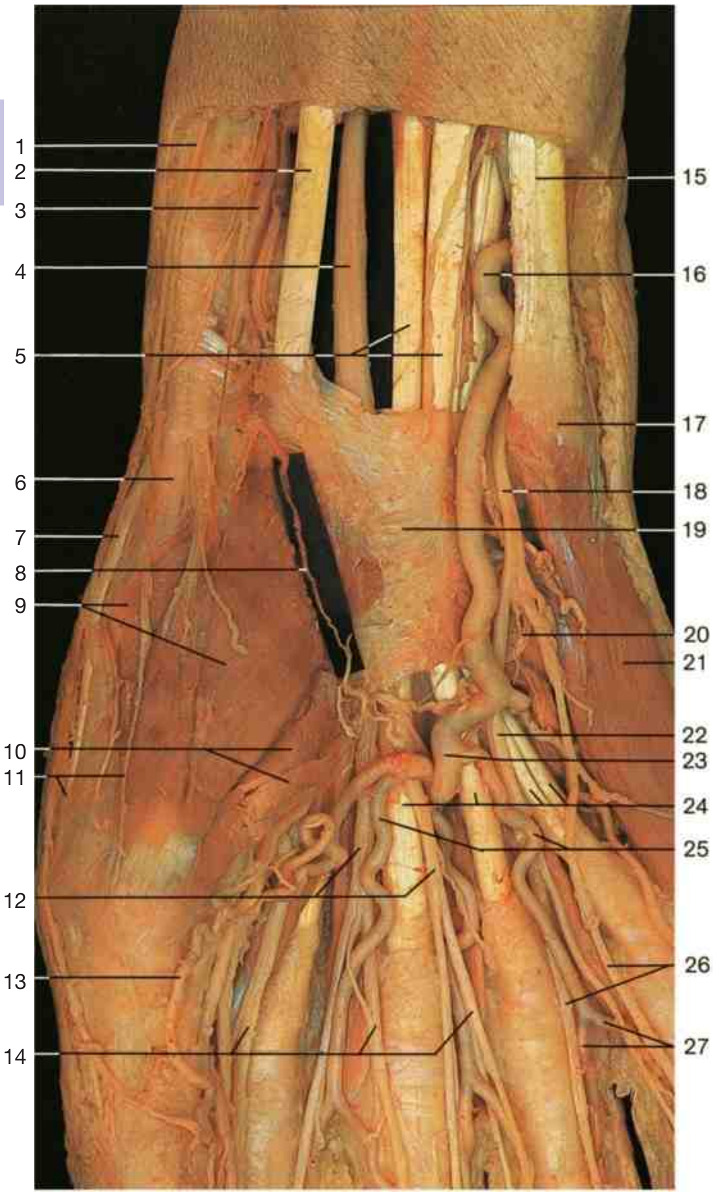


Coronal section through the left hand (posterior aspect) (MRI scan, courtesy of Prof. Heuck, Munich).



Axial section through the left hand (MRI scan; from Heuck et al., MRT-Atlas, 2009).

1 Radius
2 Wrist joint
3 Scaphoid (navicular) bone
4 Radial artery
5 Trapezoid bone
6 Trapezium bone
7 First metacarpal bone
8 Metacarpophalangeal joint of thumb
9 Interosseous muscles
10 Proximal phalanx of thumb
11 Proximal phalanx of fingers
12 Interphalangeal joints
13 Middle phalanx
14 Distal phalanx
15 Ulna
16 Distal radio-ulnar joint
17 Articular disc
18 Lunate bone
19 Triquetral bone
20 Capitate bone
21 Hamate bone
22 Carpometacarpal joints
23 Abductor digiti minimi muscle
24 Fifth metacarpal bone
25 Metacarpophalangeal joint
26 Adductor pollicis muscle
27 Proper palmar digital arteries
28 Second and third metacarpal bones
29 Tendons of flexor digitorum superficialis and profundus muscles
30 Median nerve
31 Ulnar artery and vein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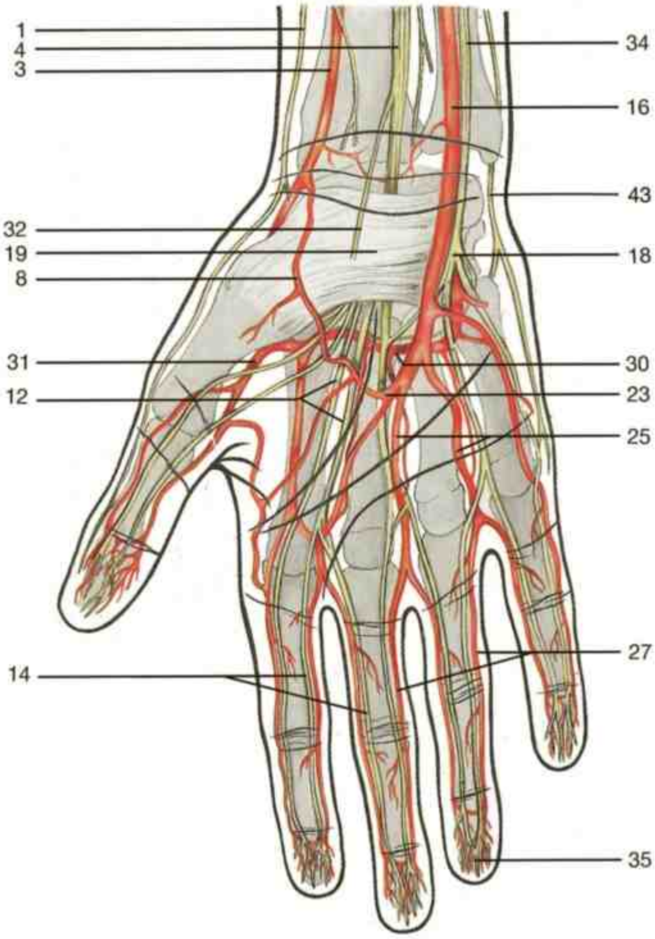
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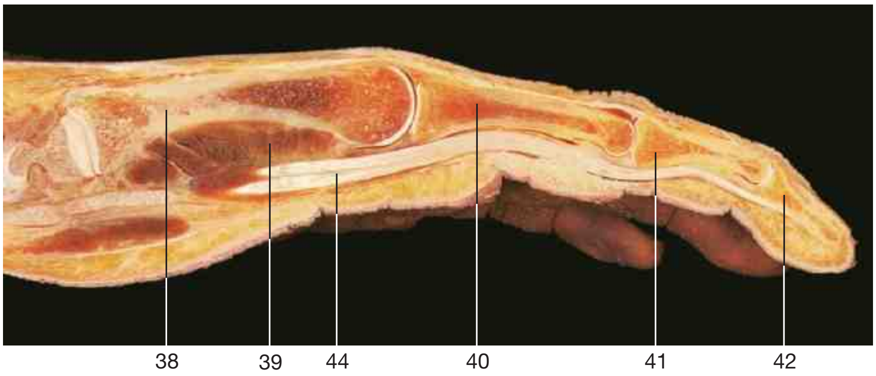
Arteries and nerves of the right hand (palmar aspect, schematic drawing).

◁

Right hand, superficial layer (palmar aspect). Dissection of the superficial palmar arch.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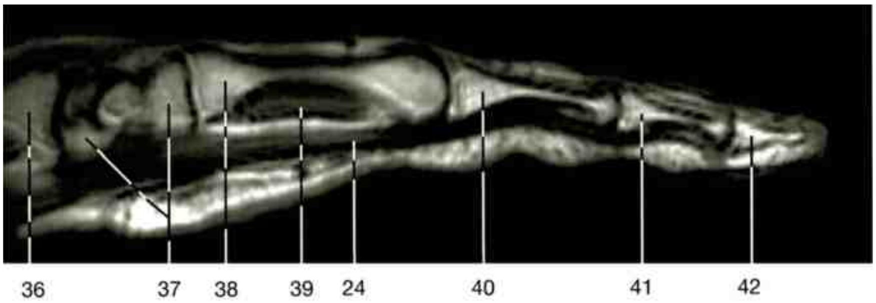
Longitudinal section through the hand at the level of the third finger.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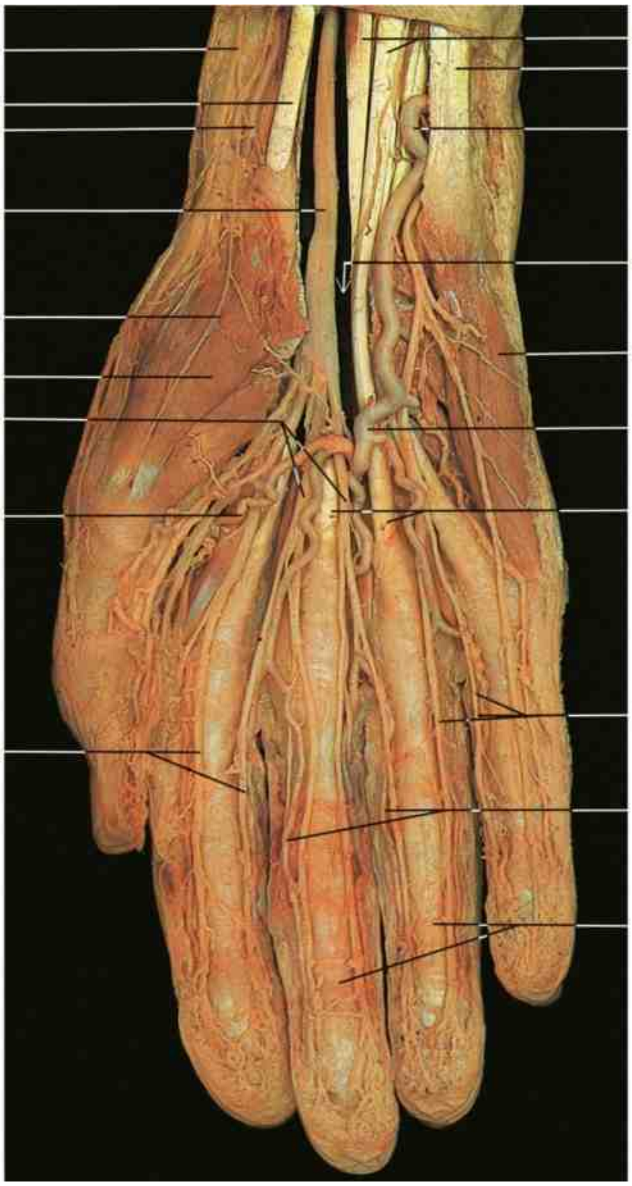
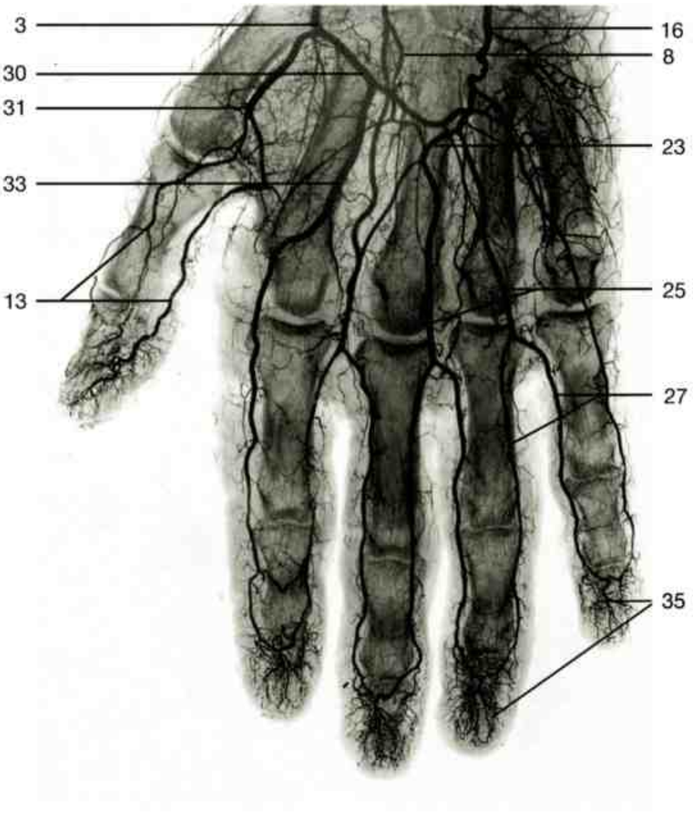
Longitudinal section through the hand at the level of the third finger (MRI scan, courtesy of Prof. Heuck, Munich).

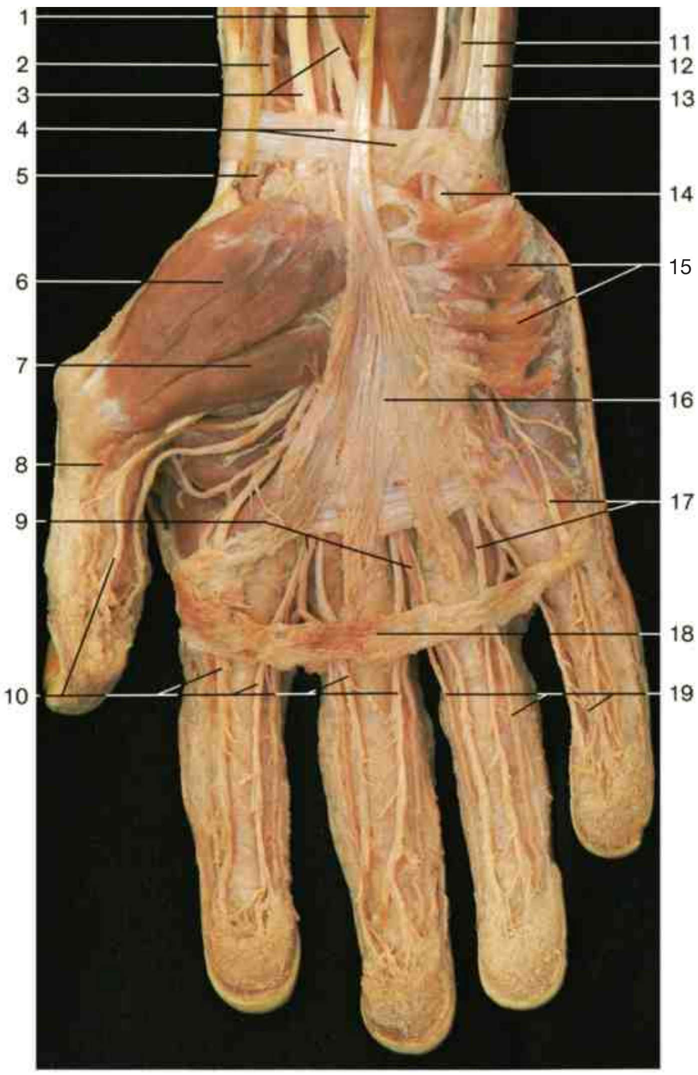


Right hand, middle layer (palmar aspect). The flexor retinaculum has been removed.

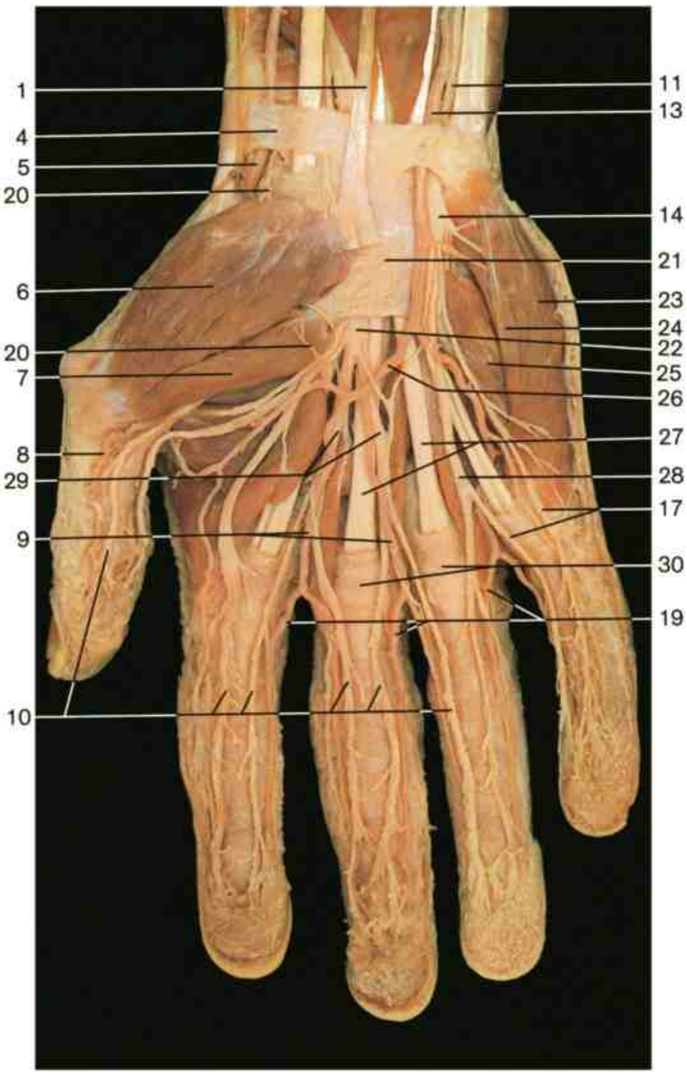


Arteriogram of the right hand (palmar aspect).

1 Superficial branch of radial nerve
2 Tendon of flexor carpi radialis muscle
3 Radial artery
4 Median nerve
5 Tendon of flexor digitorum superficialis muscle
6 Tendon of abductor pollicis longus muscle
7 Tendon of extensor pollicis brevis muscle
8 Superficial palmar branch of radial artery
9 Abductor pollicis brevis muscle
10 Superficial head of flexor pollicis brevis muscle
11 Terminal branches of superficial branch of radial nerve
12 Common palmar digital nerves (median nerve)
13 Proper palmar digital arteries of thumb
14 Proper palmar digital nerves (median nerve)
15 Tendon of flexor carpi ulnaris muscle
16 Ulnar artery
17 Position of pisiform bone
18 Superficial branch of ulnar nerve
19 Flexor retinaculum
20 Deep branch of ulnar nerve
21 Abductor digiti minimi muscle
22 Common palmar digital nerves (ulnar nerve)
23 Superficial palmar arch
24 Tendons of flexor digitorum muscles
25 Common palmar digital arteries
26 Palmar digital nerves (ulnar nerve)
27 Proper palmar digital arteries
28 Carpal tunnel
29 Fibrous sheaths for the tendons of flexor digitorum muscles
30 Deep palmar arch
31 Princeps pollicis artery
32 Palmar branch of median nerve
33 Common digital palmar artery
34 Ulnar nerve
35 Capillary network of finger
36 Radius
37 Carpal bones
38 Metacarpal bone
39 Interosseous muscles
40 Proximal phalanx
41 Middle phalanx
42 Distal phalanx
43 Dorsal branch of ulnar nerve
44 Tendons of flexor digitorum profundus (upper) and superficialis (lower) muscles

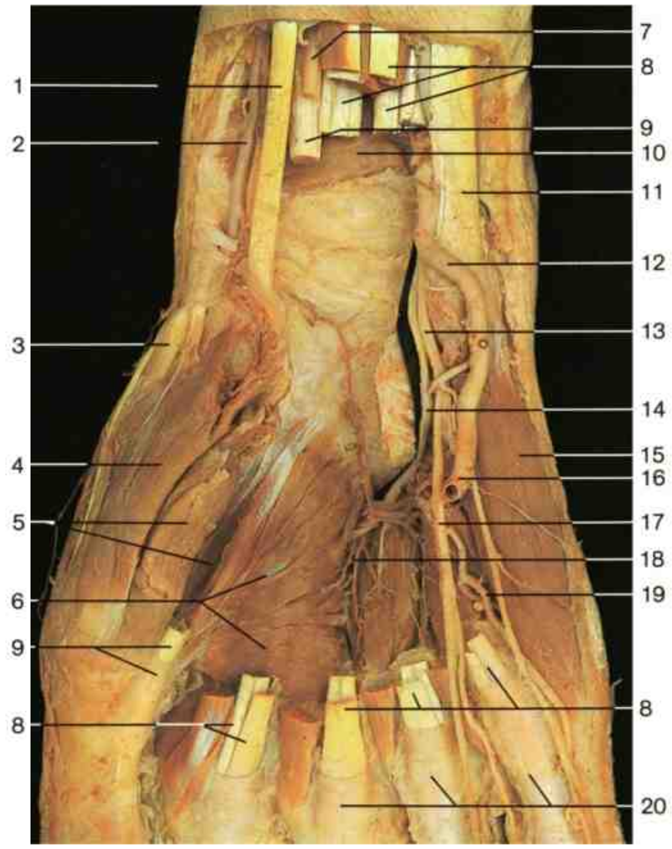


Right hand, superficial layer (palmar aspect). Dissection of vessels and nerves.

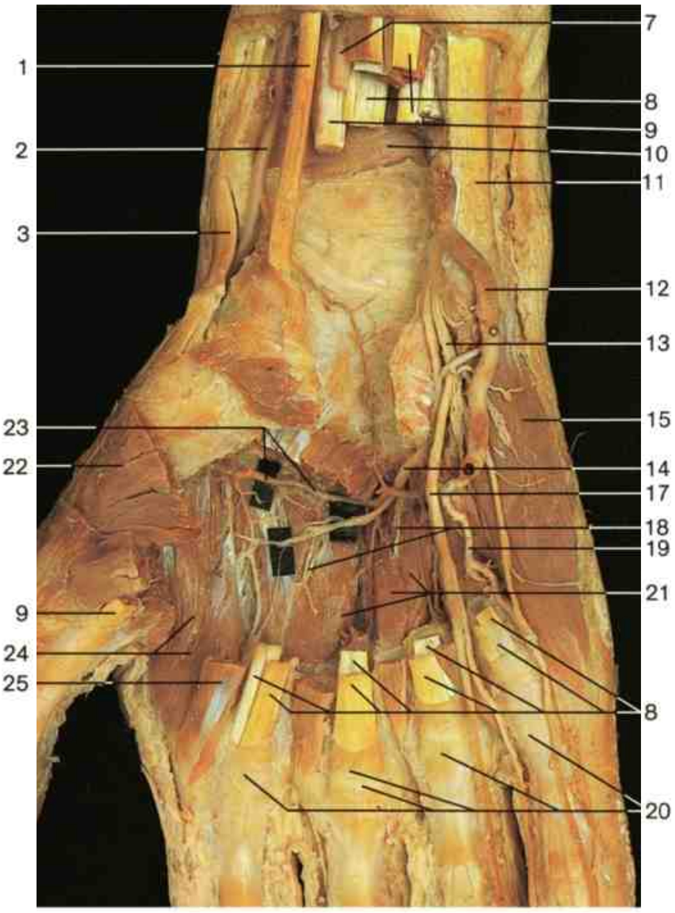


Right hand, superficial layer (palmar aspect). Dissection of vessels and nerves. The palmar aponeurosis has been removed to display the superficial palmar arch.

1 Tendon of palmaris longus muscle
2 Radial artery
3 Tendon of flexor carpi radialis muscle and median nerve
4 Distal part of antebrachial fascia
5 Radial artery passing into the anatomical snuffbox
6 Abductor pollicis brevis muscle
7 Superficial head of flexor pollicis brevis muscle
8 Palmar digital artery of thumb
9 Common palmar digital arteries
10 Proper palmar digital nerves (median nerve)
11 Ulnar nerve
12 Tendon of flexor carpi ulnaris muscle
13 Ulnar artery
14 Superficial branch of ulnar nerve
15 Palmaris brevis muscle
16 Palmar aponeurosis
17 Palmar digital nerves (ulnar nerve)
18 Superficial transverse metacarpal ligament
19 Proper palmar digital arteries
20 Superficial palmar branch of radial artery (contributing to the superficial palmar arch)
21 Flexor retinaculum
22 Median nerve
23 Abductor digiti minimi muscle
24 Flexor digiti minimi brevis muscle
25 Opponens digiti minimi muscle
26 Superficial palmar arch
27 Tendons of flexor digitorum superficialis muscle
28 Common palmar digital branch of ulnar nerve
29 Common palmar digital branch of median nerve
30 Fibrous sheath of flexor tendons

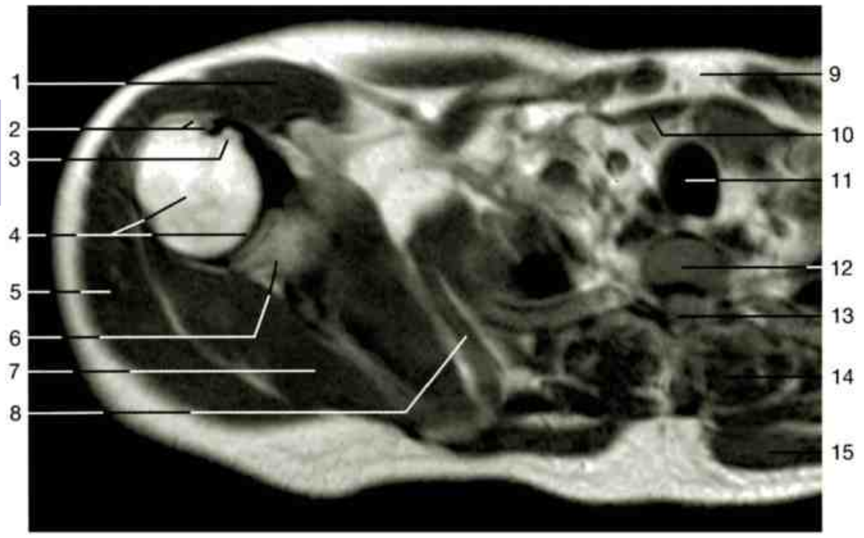


Right hand, deep layer (palmar aspect). The carpal tunnel has been opened, the tendons of the flexor muscles have been removed, and the superficial palmar arch has been cut.

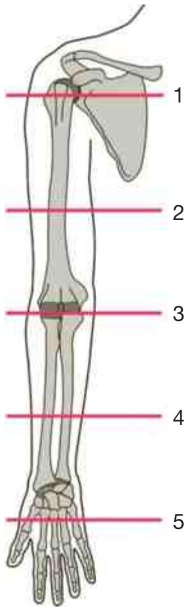


Right hand, deep layer (palmar aspect). Dissection of the deep palmar arch.

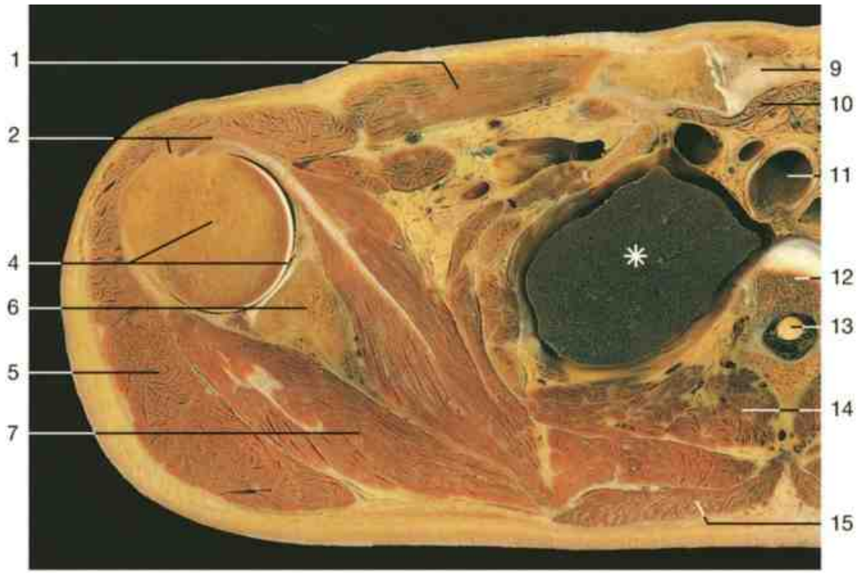
1 Tendon of flexor carpi radialis muscle
2 Radial artery
3 Tendon of abductor pollicis longus muscle
4 Abductor pollicis brevis muscle
5 Superficial and deep heads of flexor pollicis brevis muscle
6 Oblique and transverse heads of adductor pollicis muscle
7 Median nerve
8 Tendons of flexor digitorum superficialis and profundus muscles
9 Tendon of flexor pollicis longus muscle
10 Pronator quadratus muscle
11 Tendon of flexor carpi ulnaris muscle
12 Ulnar artery
13 Superficial branch of ulnar nerve
14 Deep branch of ulnar nerve
15 Abductor digiti minimi muscle
16 Superficial palmar arch (cut end)
17 Common palmar digital nerves (ulnar nerve)
18 Palmar metacarpal arteries of deep palmar arch
19 Palmar digital artery of the fifth finger
20 Fibrous sheaths of tendons of flexor muscles
21 Palmar interosseous muscles
22 Opponens pollicis muscle (cut)
23 Deep palmar arch
24 First dorsal interosseous muscle
25 First lumbrical muscle



Horizontal section through the right shoulder joint (section 1; MRI scan; inferior aspect).

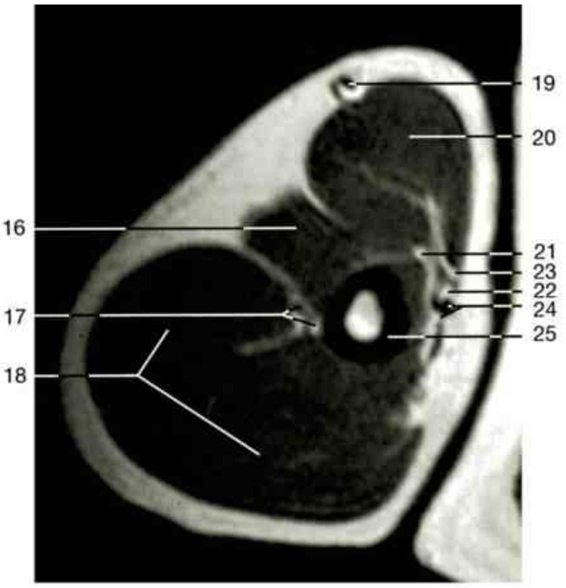


Upper limb,
location of sections 1–5
(MRI scans, p. 430: courtesy of Prof. Heuck, Munich, Germany;
MRI scans, p. 431: courtesy of Prof. Bautz and R. Janka, M. D., University of Erlangen, Germany).

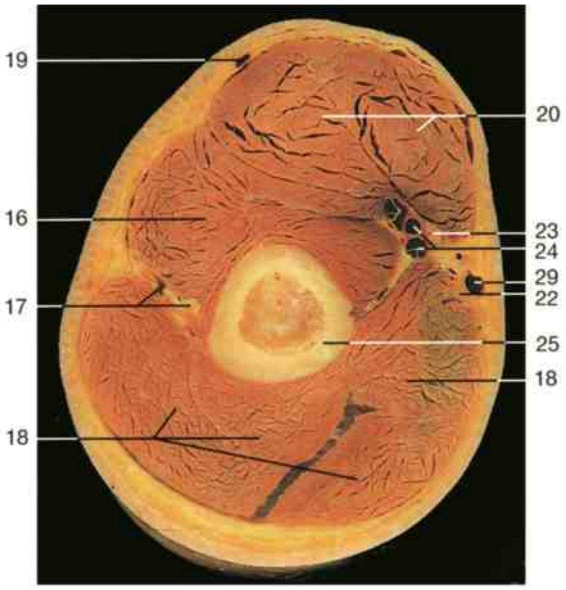


Horizontal section through the right shoulder joint (section 1; inferior aspect).
* = Upper lobe of lung.

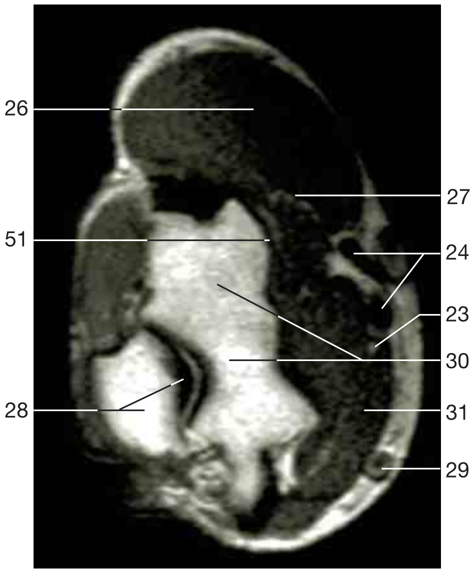
1 Pectoralis major muscle
2 Greater tubercle and tendon of biceps muscle
3 Lesser tubercle
4 Head of humerus and articular cavity of shoulder joint
5 Deltoid muscle
6 Scapula
7 Infraspinatus muscle
8 Serratus anterior muscle
9 Sternum
10 Infrahyoid muscles
11 Trachea
12 Body of thoracic vertebra
13 Vertebral canal and spinal cord
14 Deep muscles of the back
15 Trapezius muscle
16 Brachialis muscle
17 Radial nerve and profunda brachii vessels



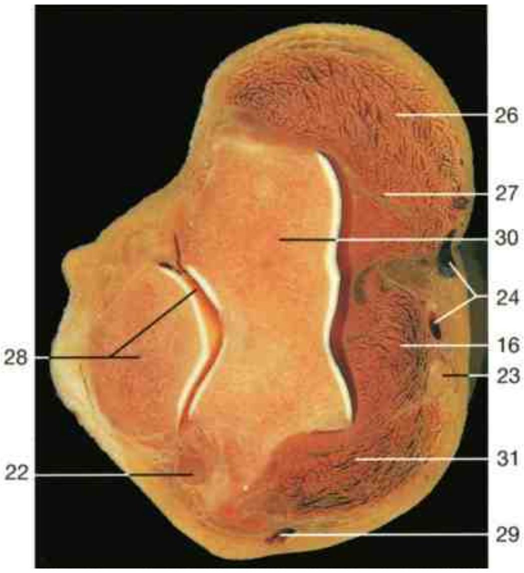
Axial section through the middle of the right arm (section 2; MRI scan; inferior aspect).



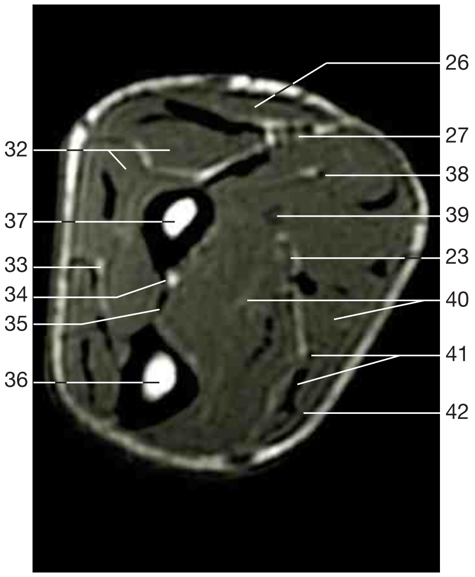
Axial section through the middle of the right arm (section 2; inferior aspect).



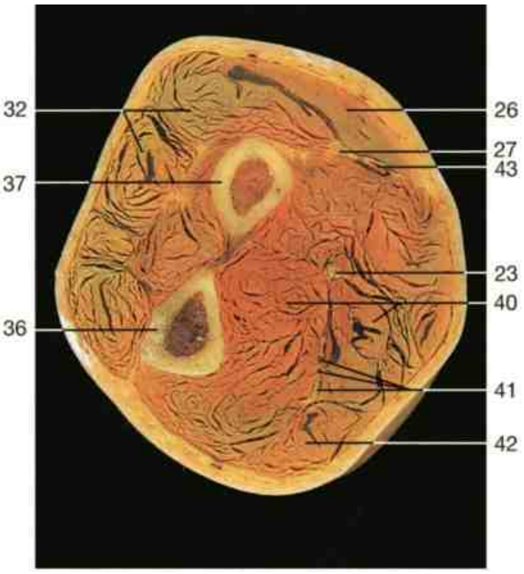
Axial section through the right elbow joint (section 3; MRI scan; inferior aspect).



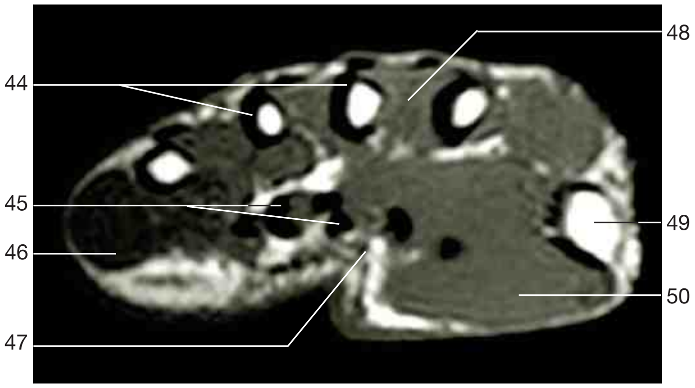
Axial section through the right elbow joint (section 3; inferior aspect).



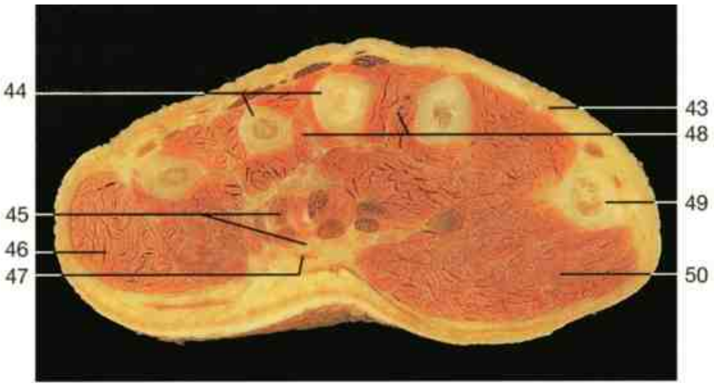
Axial section through the middle of the right forearm (section 4; MRI scan; inferior aspect).



Axial section through the middle of the right forearm (section 4; inferior aspect).



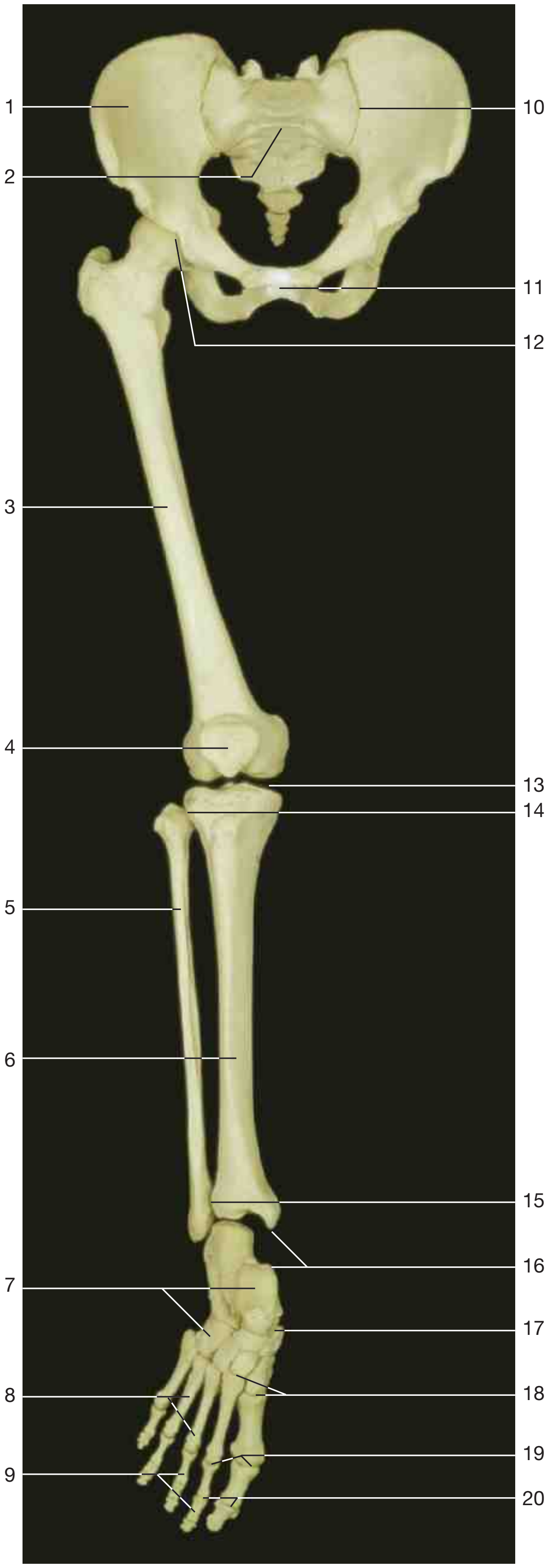
Axial section through the right hand at the level of the metacarpus (section 5; MRI scan; inferior aspect).



Axial section through the right hand at the level of the metacarpus (section 5; inferior aspect).

18 Triceps brachii muscle
19 Cephalic vein
20 Biceps brachii muscle
21 Musculocutaneous nerve
22 Ulnar nerve
23 Medianus nerve
24 Brachial artery and vein
25 Shaft of humerus
26 Brachioradialis muscle
27 Radial nerve
28 Olecranon and articular cavity of elbow joint
29 Basilic vein
30 Humerus
31 Pronator teres muscle
32 Extensor muscles of forearm
33 Ramus profundus of radialis nerve
34 Anterior interosseus vessels and nerve
35 Interosseous membrane
36 Ulna
37 Radius
38 Radial artery and superficial branch of radial nerve
39 Flexor pollicis longus muscle
40 Flexor digitorum superficialis and profundus muscles
41 Ulnar nerve, ulnar artery, and vein
42 Flexor carpi ulnaris muscle
43 Radial artery
44 Metacarpal bones III and IV
45 Carpal canal with tendons of flexor digitorum muscles
46 Hypothenar muscle
47 Median nerve
48 Interosseous muscles
49 First metacarpal bone
50 Thenar muscles
51 Articular cavity of humeroradial joint

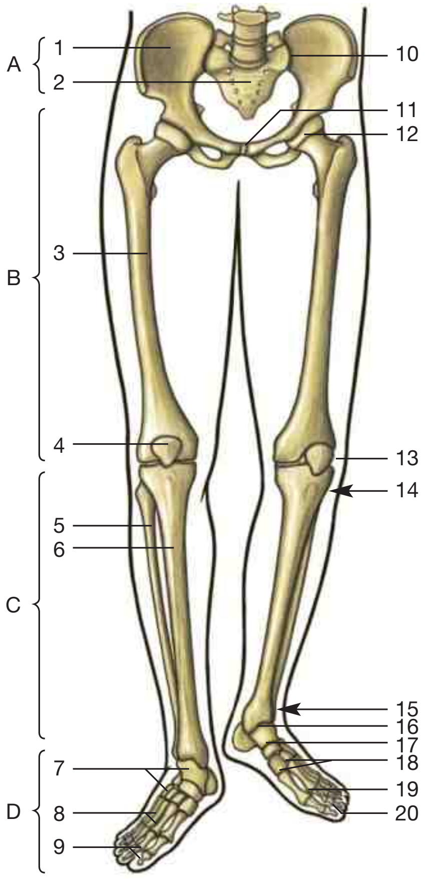
8 Lower Limb



Skeleton of pelvic girdle and lower limb (anterior aspect). The ankle joint has been dislocated.

The lower limb (extremity) is specialized for support of the upright posture, locomotion, and maintaining balance. In contrast to the upper limb, the lower limb is more restricted in its movements, and the joints are tighter and fixed by strong ligaments. The hip joint is a ball-and-socket type of synovial joint between the head of the femur and acetabulum. The knee joint is a hinge type of synovial joint that permits only limited rotation. The talocrural joint is a hinge joint between the talus, fibula, and tibia, only allowing movements of flexion and extension.

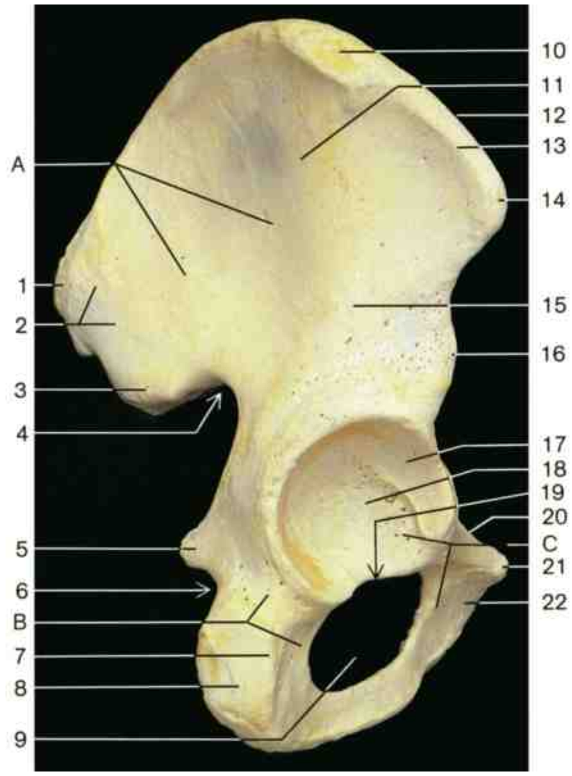
The long axis of the foot is at a right angle to that of the leg, thus forming an effective arch for the upright stance of the body.



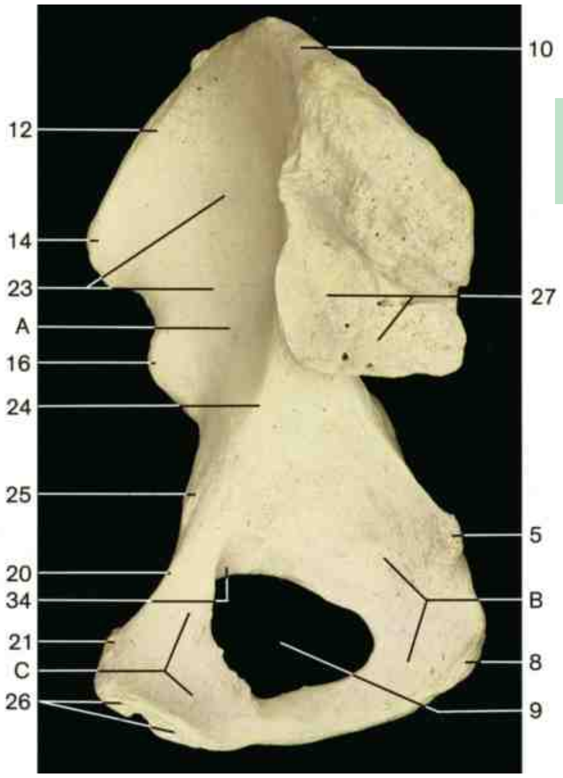
A = pelvic girdle
B = thigh
C = leg
D = foot

Organization of pelvic girdle and lower limb.

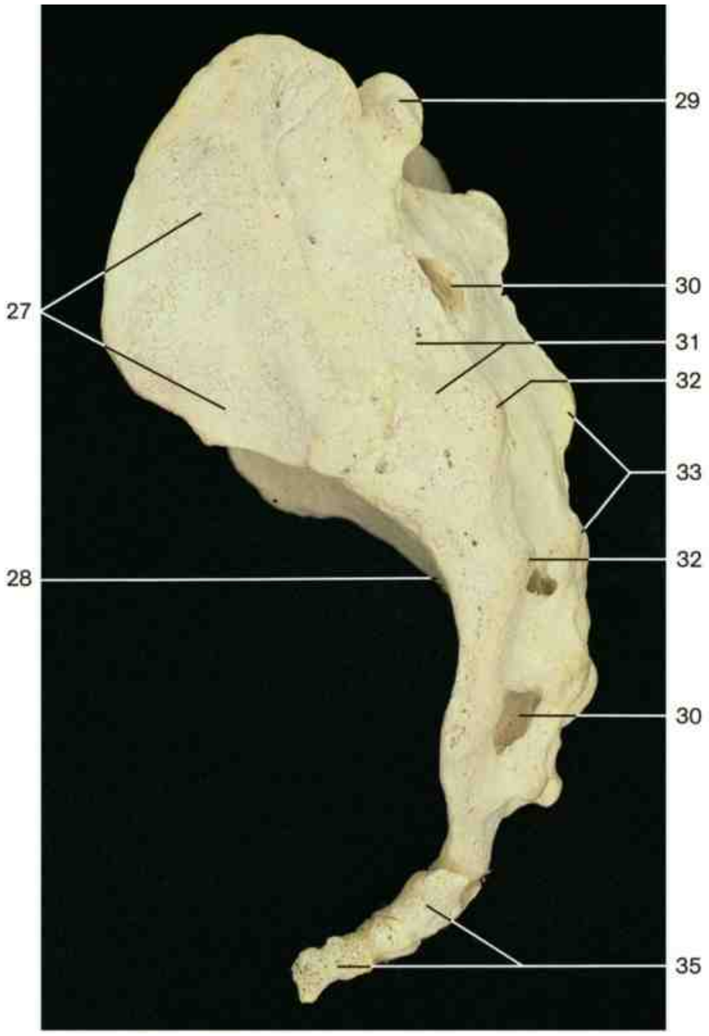
1	Right hip bone	11	Pubic symphysis
2	Sacrum	12	Hip joint
3	Femur	13	Knee joint
4	Patella	14	Proximal tibiofibular joint
5	Fibula	15	Distal tibiofibular joint
6	Tibia	16	Ankle joint
7	Tarsal bones	17	Talocalcaneonavicular joint
8	Metatarsal bones	18	Tarsometatarsal joints
9	Phalanges	19	Metatarsophalangeal joints
10	Sacro-iliac joint	20	Interphalangeal joints



Right hip bone (lateral aspect).



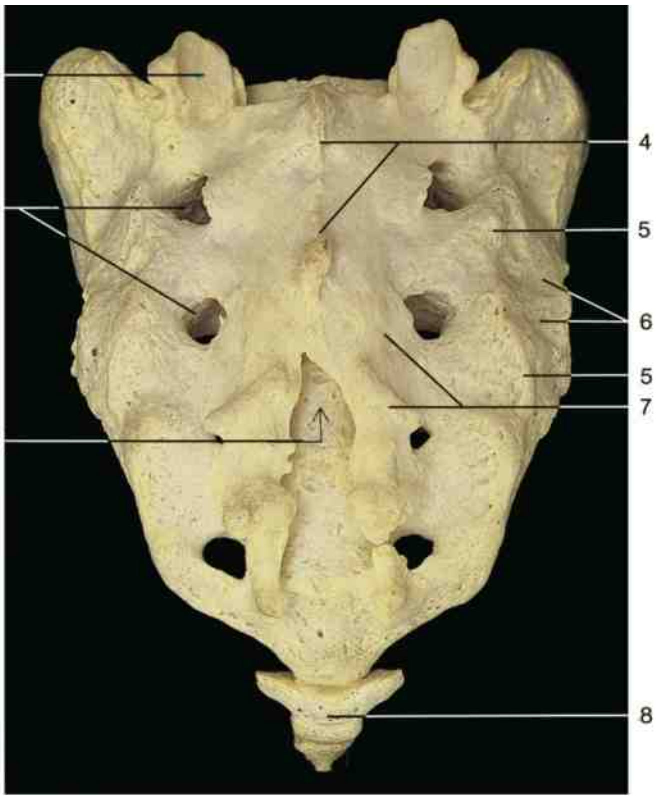
Right hip bone (medial aspect).



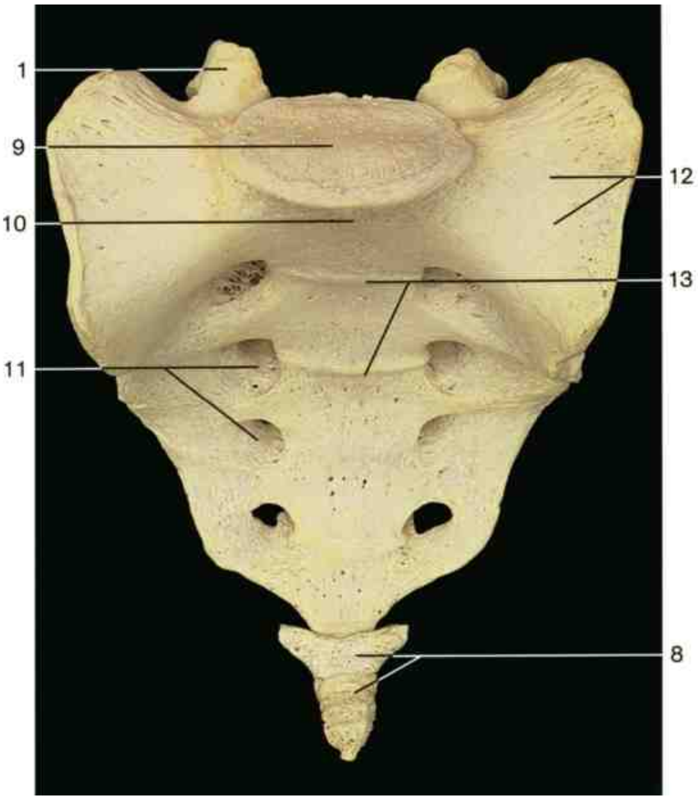
Sacrum and coccyx (lateral aspect).

A = ilium
B = ischium
C = pubis

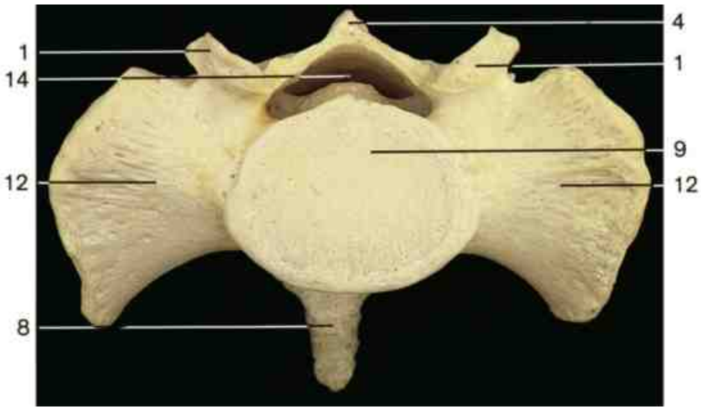
1	Posterior superior iliac spine
2	Posterior gluteal line
3	Posterior inferior iliac spine
4	Greater sciatic notch
5	Ischial spine
6	Lesser sciatic notch
7	Body of ischium
8	Ischial tuberosity
9	Obturator foramen
10	Iliac crest
11	Anterior gluteal line
12	Internal lip of iliac crest
13	External lip of iliac crest
14	Anterior superior iliac spine
15	Inferior gluteal line
16	Anterior inferior iliac spine
17	Lunate surface of acetabulum
18	Acetabular fossa
19	Acetabular notch
20	Pecten pubis
21	Pubic tubercle
22	Body of pubis
23	Iliac fossa
24	Arcuate line
25	Iliopubic eminence
26	Symphysial surface of pubis
27	Auricular surface
28	Pelvic surface of sacrum
29	Superior articular process of sacrum
30	Dorsal sacral foramina
31	Sacral tuberosity
32	Lateral sacral crest
33	Median sacral crest
34	Obturator groove
35	Coccyx



Sacrum (posterior aspect).

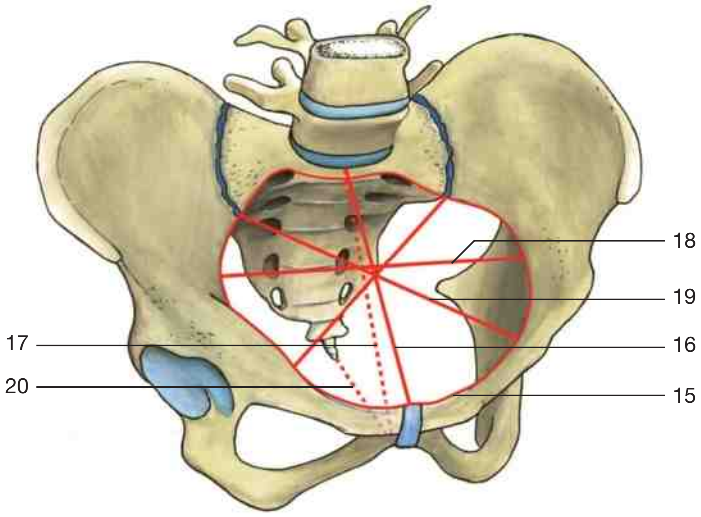


Sacrum (anterior aspect).



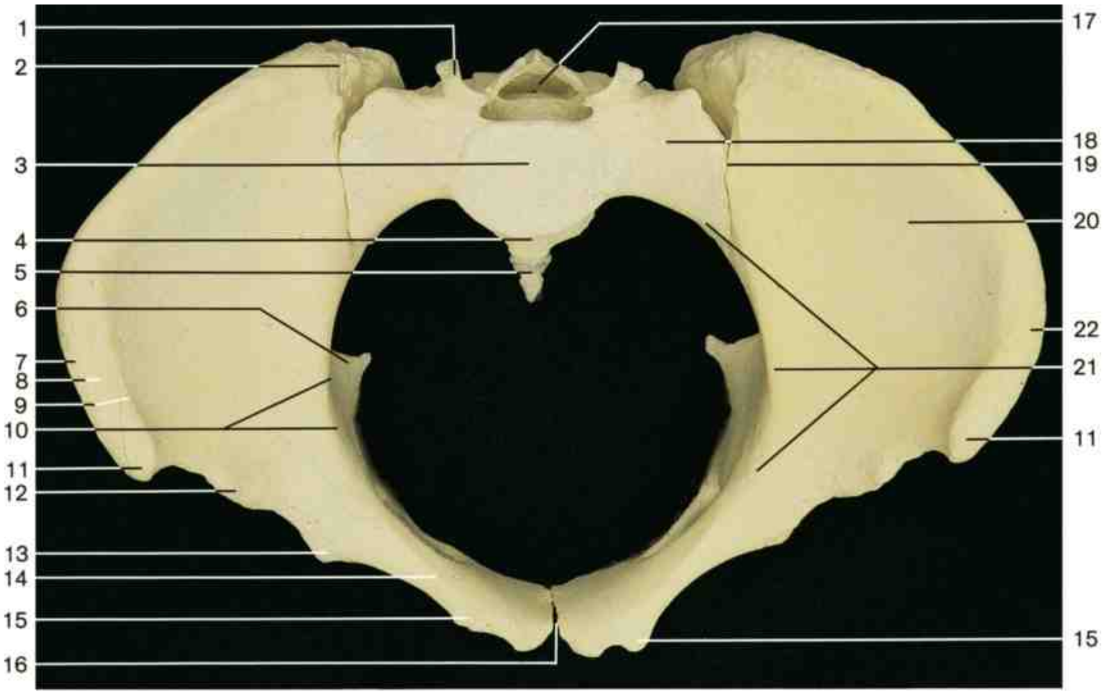
Sacrum (superior aspect).

1	Superior articular process of sacrum
2	Dorsal sacral foramina
3	Sacral hiatus
4	Median sacral crest
5	Lateral sacral crest
6	Sacral tuberosity
7	Intermediate sacral crest
8	Coccyx
9	Base of sacrum
10	Sacral promontory
11	Anterior sacral foramina
12	Lateral part of sacrum (ala)
13	Transverse line of sacrum
14	Sacral canal
15	Linea terminalis
16	True conjugate
17	Diagonal conjugate
18	Transverse diameter
19	Oblique diameter
20	Inferior pelvic aperture or outlet



Diameters of pelvis (oblique superior aspect). (Schematic drawing.)

The pelvic girdle is firmly connected to the vertebral column at the sacro-iliac joint. Therefore, the body can be kept upright more easily even if only one limb is used for support (as in walking). The mobility of the lower limb is more limited than that of the upper limb.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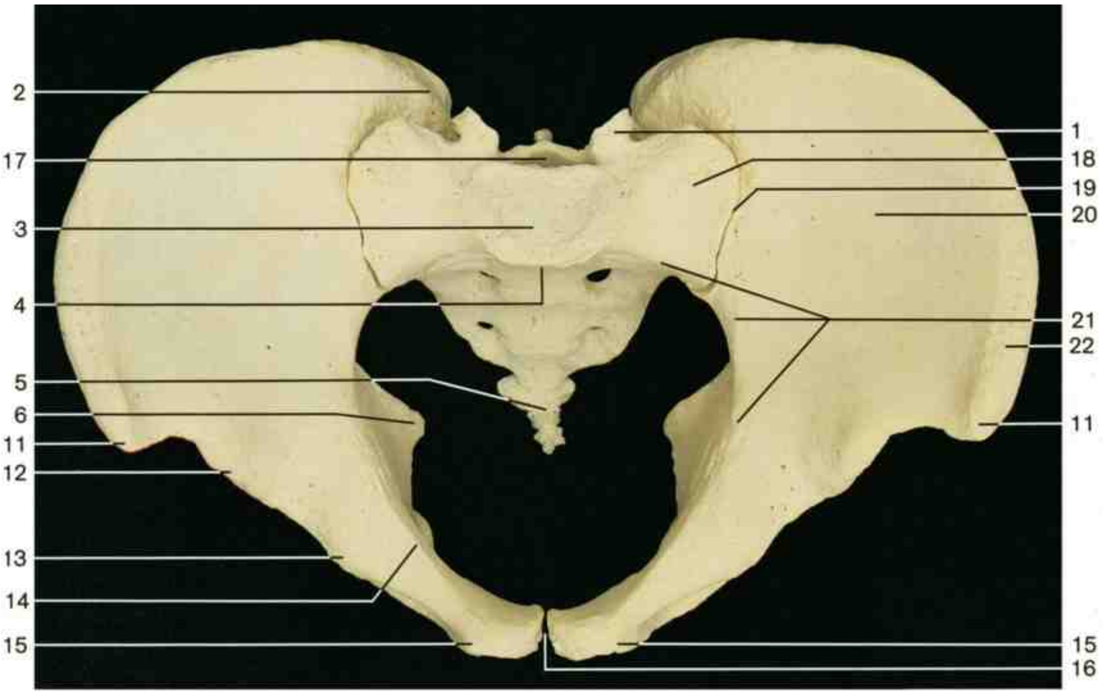
Female pelvis (superior aspect). Note the differences between the male and female pelvis, predominantly in the form and dimensions of the sacrum, the superior and inferior apertures, and the alae of the ilium.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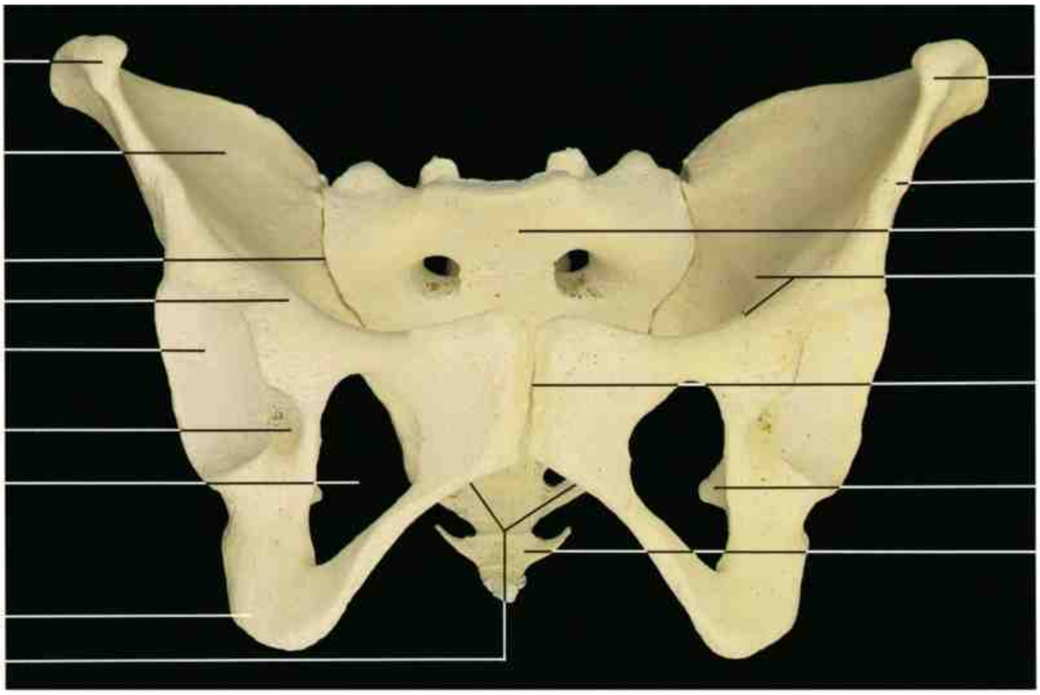
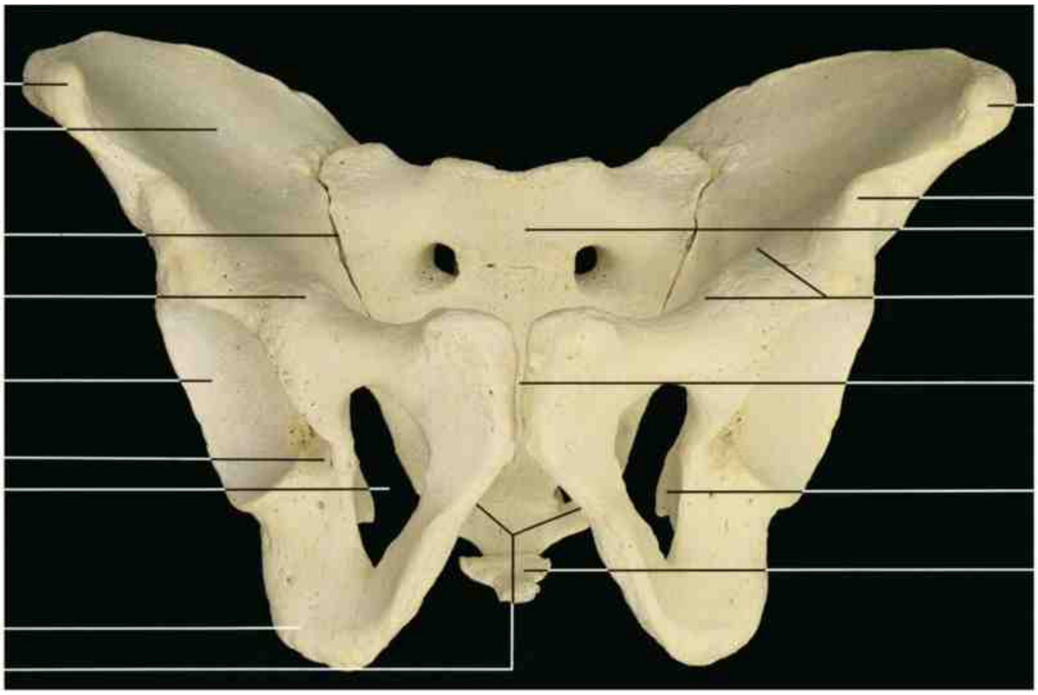
Male pelvis (superior aspect). Compare with the female pelvis (depicted above).

1 Superior articular process of sacrum
2 Posterior superior iliac spine
3 Base of sacrum
4 Sacral promontory
5 Coccyx
6 Ischial spine
7 External lip }
8 Intermediate line } of iliac crest
9 Internal lip }
10 Arcuate line
11 Anterior superior iliac spine

12 Anterior inferior iliac spine
13 Iliopubic eminence
14 Pecten pubis
15 Pubic tubercle
16 Pubic symphysis
17 Sacral canal
18 Ala of sacrum
19 Position of sacro-iliac joint
20 Iliac fossa
21 Linea terminalis
22 Iliac crest

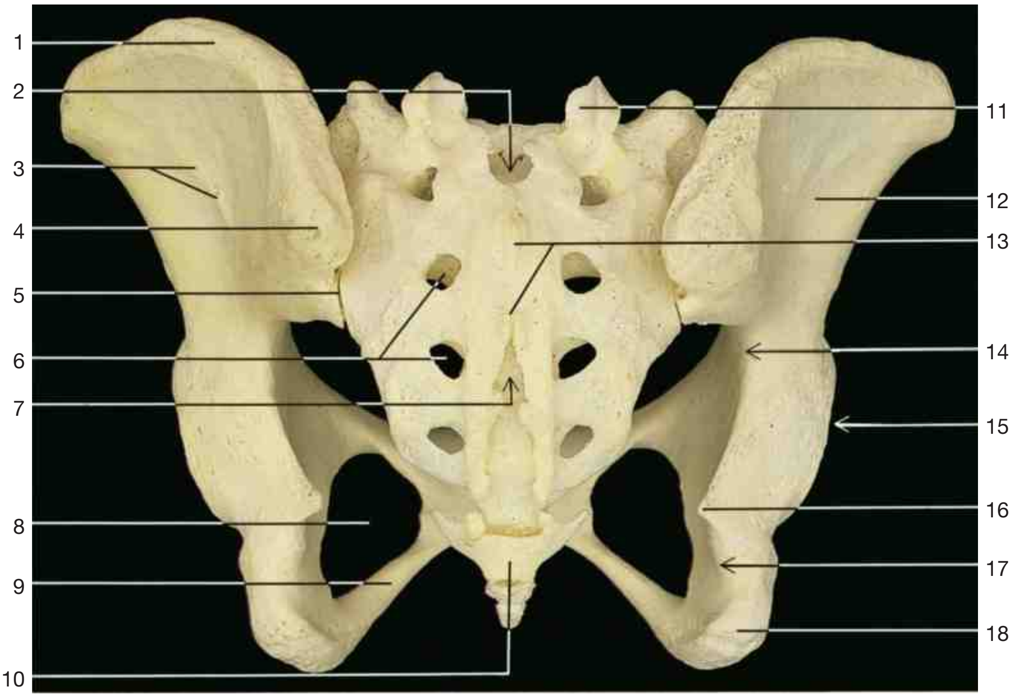


Female pelvis (anterior aspect). Note the differences between the form and dimensions of the male and female pelvis. The female pubic arch is wider than the male. The obturator foramen in the female pelvis is triangular, while that in the male pelvis is ovoid.

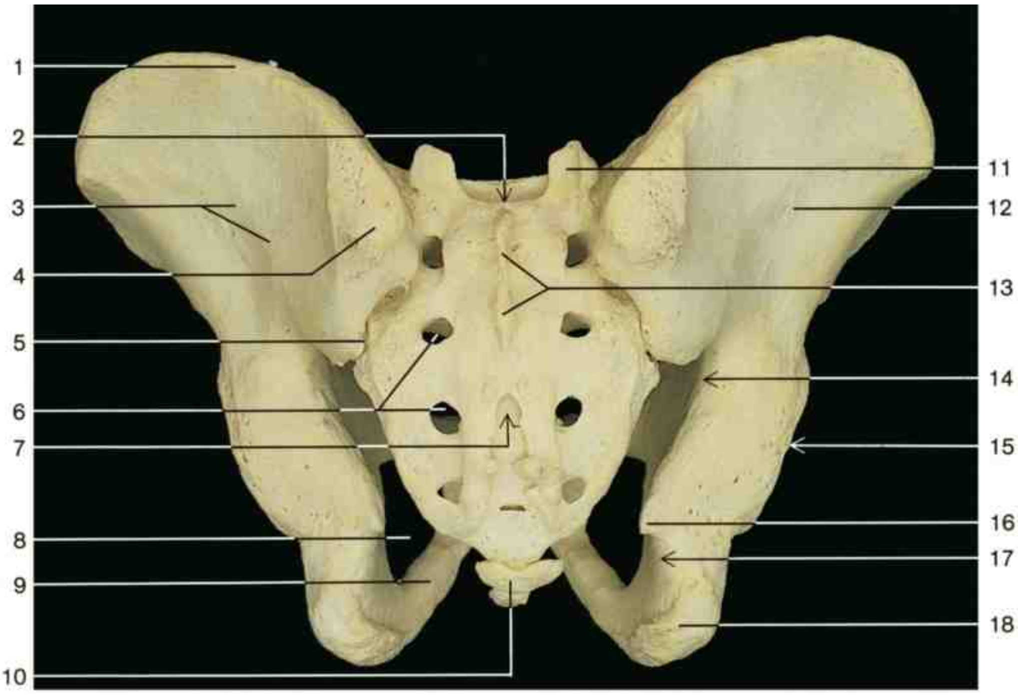


Male pelvis (anterior aspect). Compare with the female pelvis (depicted above).

1 Anterior superior iliac spine
2 Iliac fossa
3 Position of sacro-iliac joint
4 Iliopubic eminence
5 Lunate surface of acetabulum
6 Acetabular notch
7 Obturator foramen
8 Ischial tuberosity
9 Pubic arch
10 Anterior inferior iliac spine
11 Sacrum
12 Linea terminalis (at margin of superior aperture)
13 Pubic symphysis
14 Ischial spine
15 Coccyx

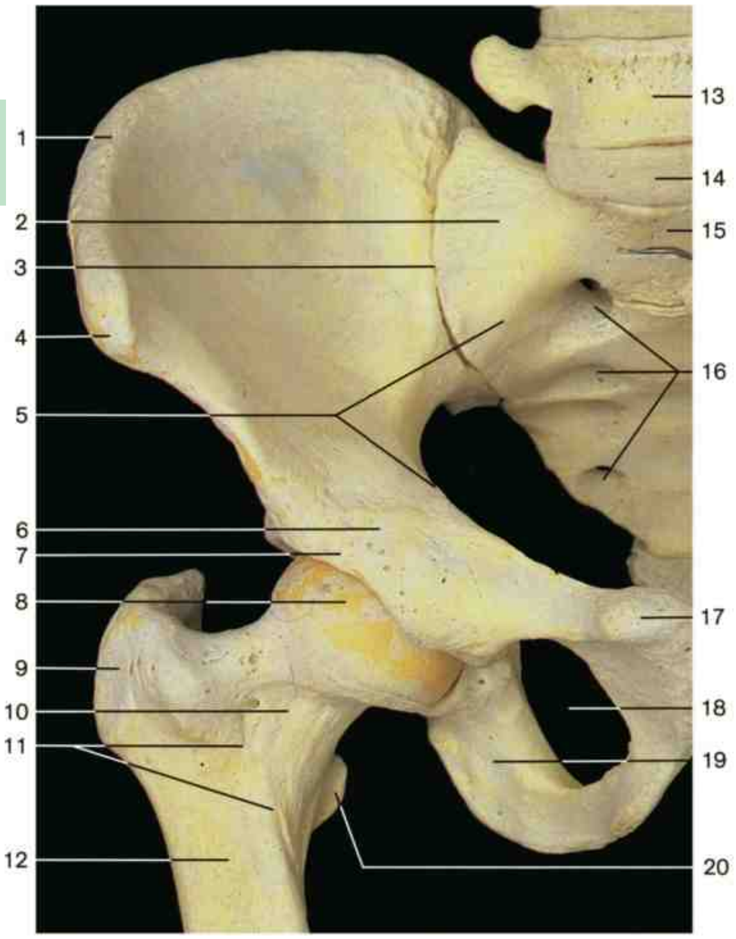


Female pelvis (posterior aspect). Note the differences between the female and male pelvis, especially with respect to the inferior aperture, the shape of the sacrum, the two sciatic notches, and the pubic arch.

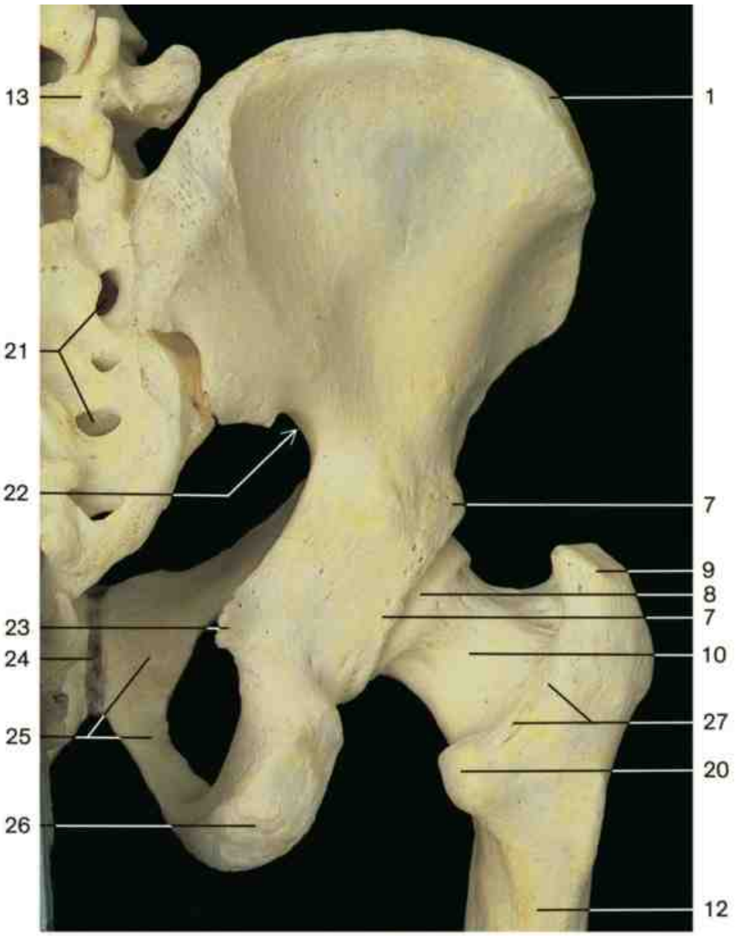


Male pelvis (posterior aspect). Compare with the female pelvis (depicted above).

1	Iliac crest	10	Coccyx
2	Sacral canal	11	Superior articular process of sacrum
3	Posterior gluteal line	12	Gluteal surface of ilium
4	Posterior superior iliac spine	13	Median sacral crest
5	Position of sacro-iliac joint	14	Greater sciatic notch
6	Dorsal sacral foramina	15	Position of acetabulum
7	Sacral hiatus	16	Ischial spine
8	Obturator foramen	17	Lesser sciatic notch
9	Ramus of ischium	18	Ischial tuberosity



Bones of right hip joint (anterior aspect).

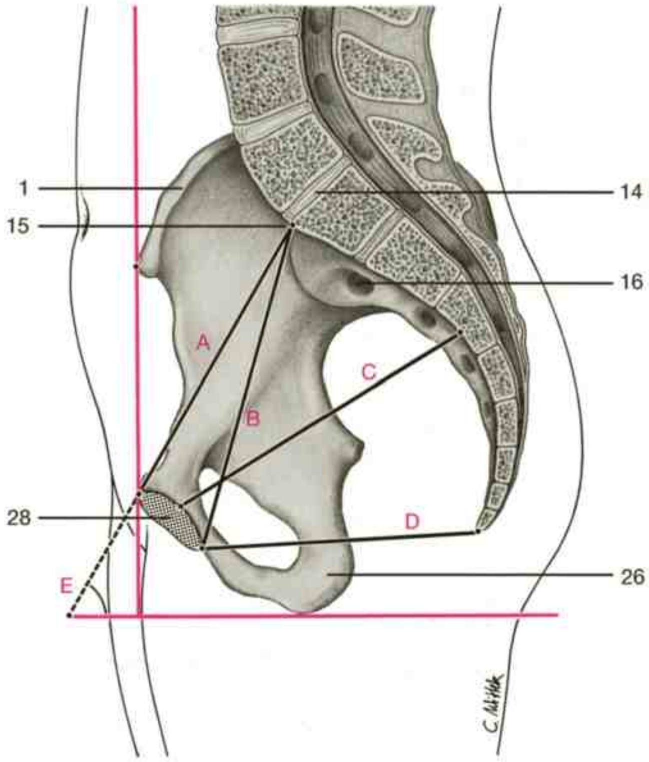


Bones of right hip joint (posterior aspect).

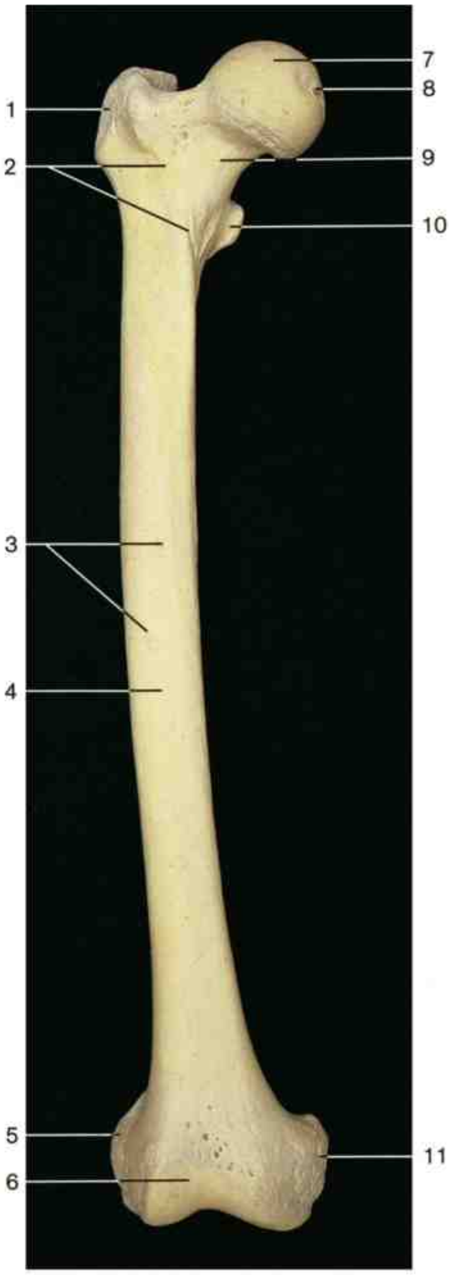
1	Iliac crest
2	Lateral part of sacrum (ala)
3	Position of sacro-iliac joint
4	Anterior superior iliac spine
5	Linea terminalis
6	Iliopubic eminence
7	Bony margin of acetabulum
8	Head of femur
9	Greater trochanter
10	Neck of femur
11	Intertrochanteric line
12	Shaft of femur
13	Fifth lumbar vertebra
14	Imitation intervertebral disc between fifth lumbar vertebra and sacrum
15	Sacral promontory
16	Anterior sacral foramina
17	Pubic tubercle
18	Obturator foramen
19	Ramus of ischium
20	Lesser trochanter
21	Dorsal sacral foramina
22	Greater sciatic notch
23	Ischial spine
24	Pubic symphysis
25	Pubis
26	Ischial tuberosity
27	Intertrochanteric crest
28	Symphysial surface

Diameters of the pelvis

A = true conjugate (11–11.5 cm) (conjugata vera)
B = diagonal conjugate (12.5–13 cm)
C = largest diameter of pelvis
D = inferior pelvic aperture
E = pelvic inclination (60°)



Inclination and diameters of the female pelvis, right half (medial aspect).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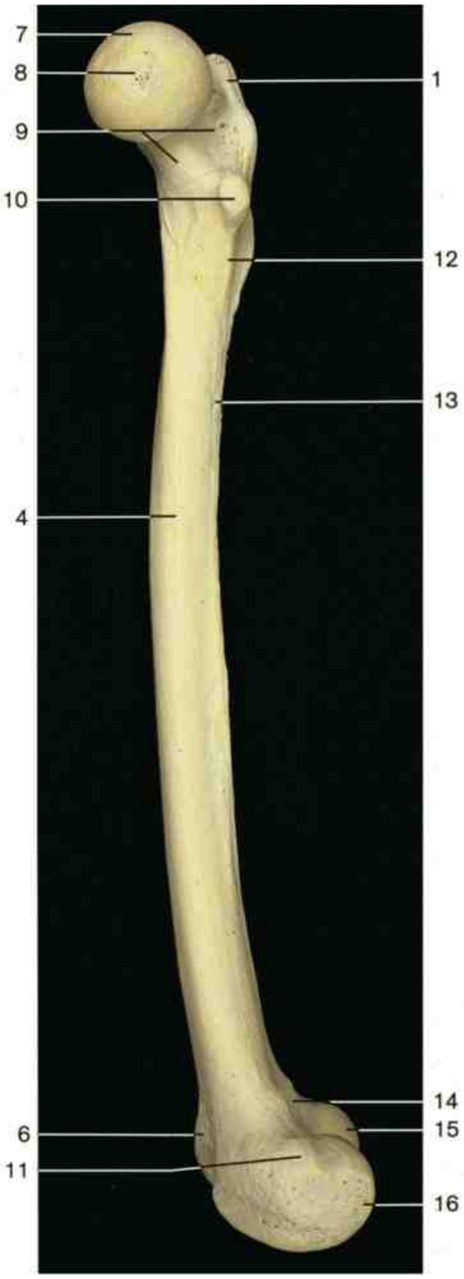
Right femur (anterior aspect).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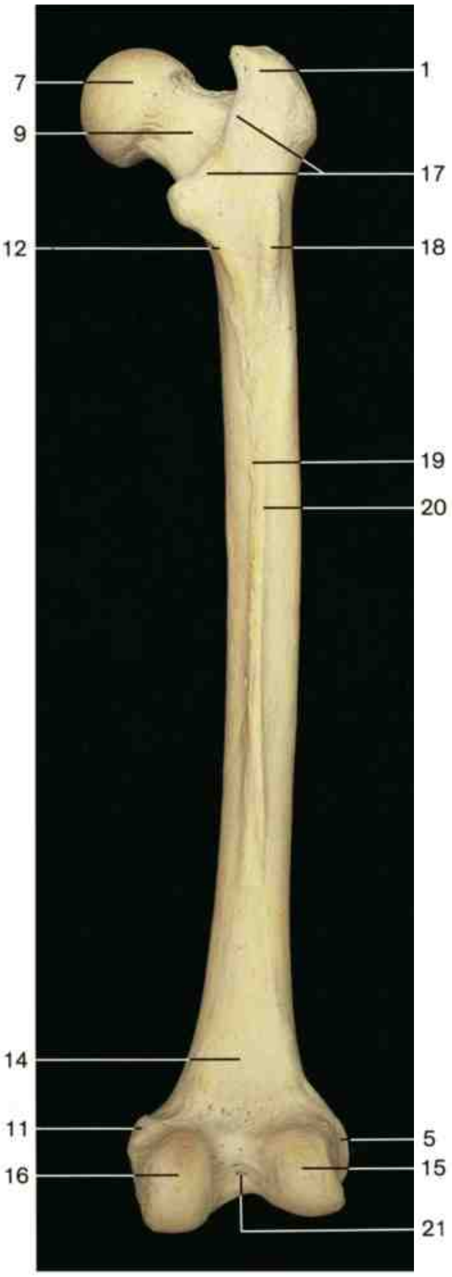
Right femur (medial aspect).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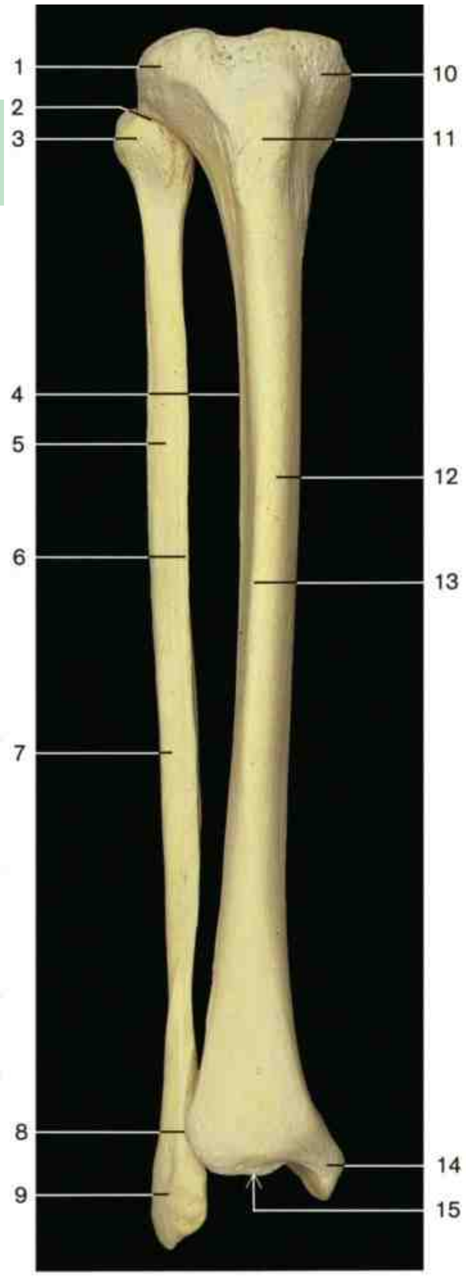
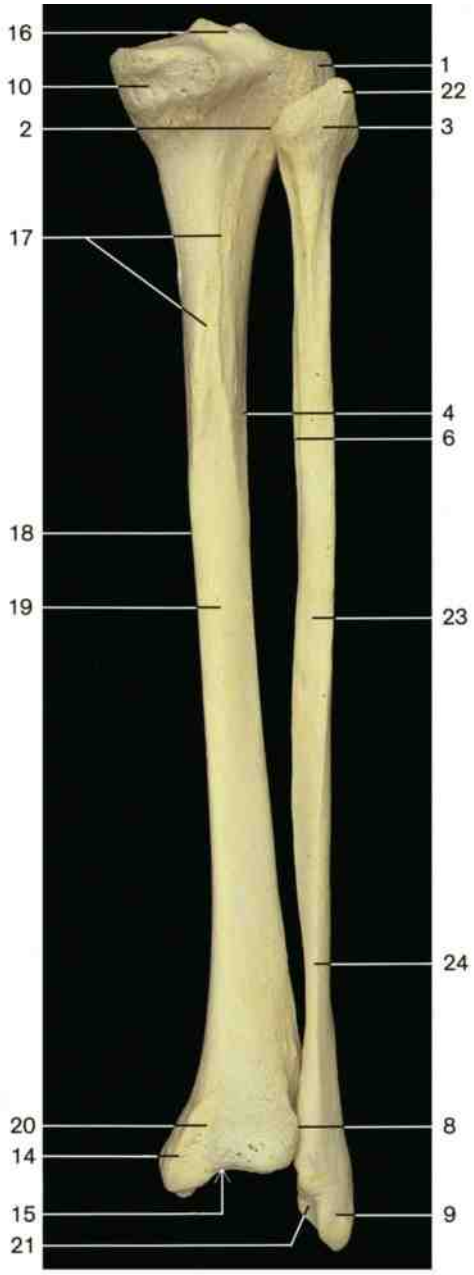
Right femur (posterior aspect).

1 Greater trochanter
2 Intertrochanteric line
3 Nutrient foramina
4 Shaft of femur (diaphysis)
5 Lateral epicondyle
6 Patellar surface
7 Head
8 Fovea of head
9 Neck
10 Lesser trochanter
11 Medial epicondyle
12 Pectineal line
13 Linea aspera
14 Popliteal surface
15 Lateral condyle
16 Medial condyle
17 Intertrochanteric crest
18 Third trochanter
19 Medial lip of linea aspera
20 Lateral lip of linea aspera
21 Intercondylar fossa

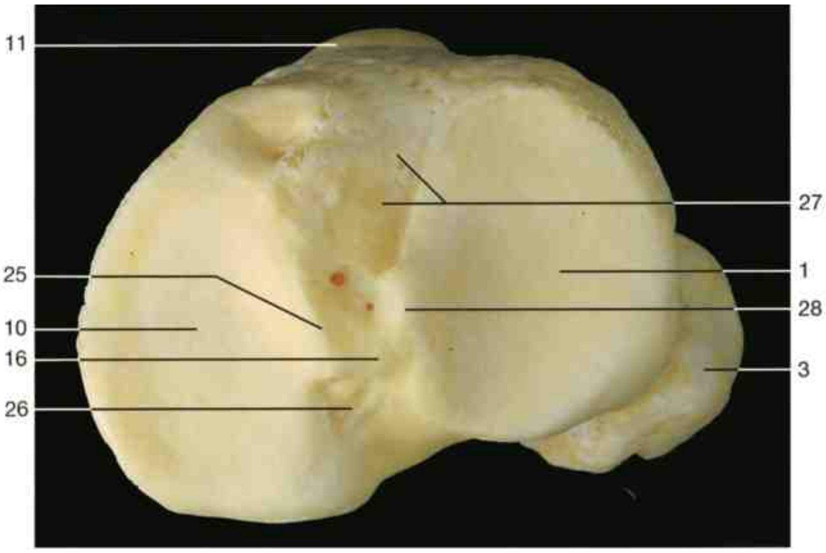


Bones of leg, right tibia, and fibula (anterior aspect).

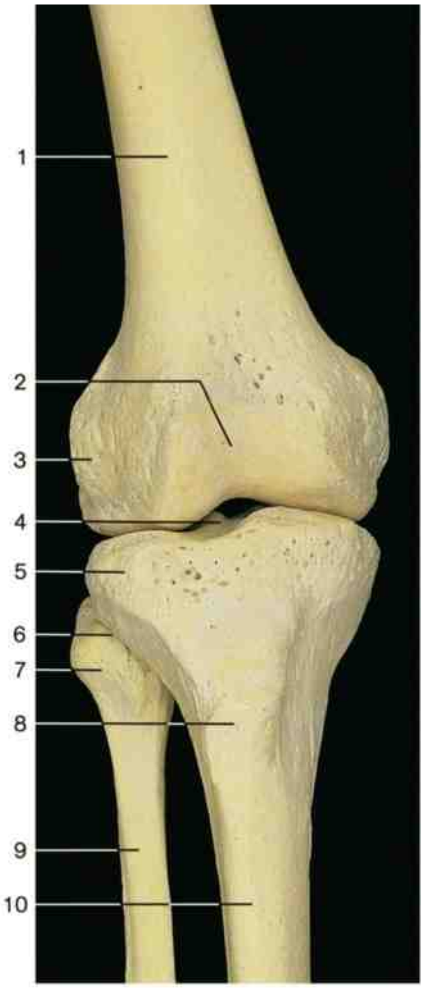


Bones of leg, right tibia, and fibula (posterior aspect).

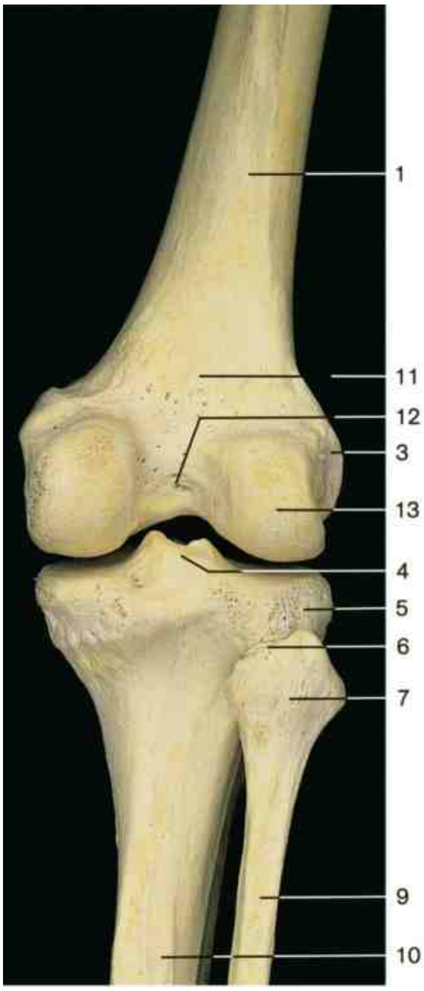
1	Lateral condyle of tibia
2	Position of tibiofibular joint
3	Head of fibula
4	Interosseous border of tibia
5	Shaft of fibula
6	Interosseous border of fibula
7	Lateral surface of fibula
8	Position of tibiofibular joint
9	Lateral malleolus
10	Medial condyle of tibia
11	Tuberosity of tibia
12	Shaft of tibia (diaphysis)
13	Anterior margin of tibia
14	Medial malleolus
15	Inferior articular surface of tibia
16	Intercondylar eminence
17	Soleal line
18	Medial border of tibia
19	Posterior surface of tibia
20	Malleolar sulcus of tibia
21	Malleolar articular surface of fibula
22	Apex of head of fibula
23	Posterior surface of fibula
24	Posterior border of fibula
25	Medial intercondylar tubercle
26	Posterior intercondylar area
27	Anterior intercondylar area
28	Lateral intercondylar tubercle



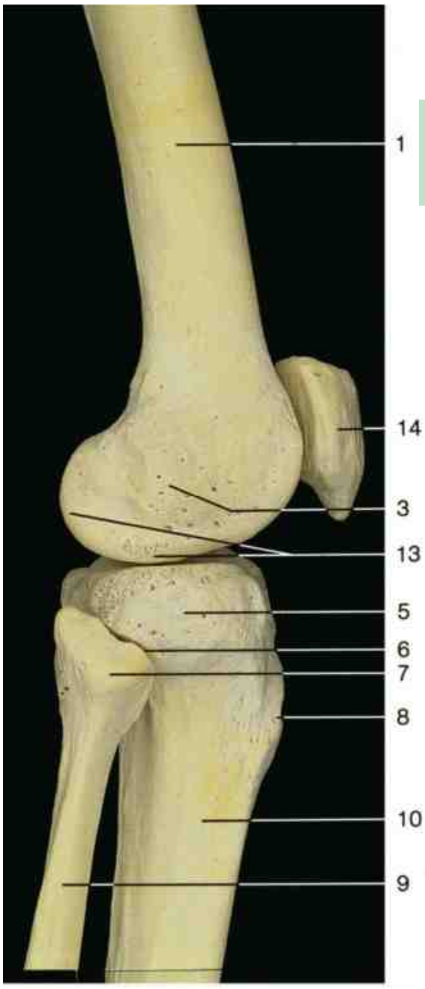
Upper end of right tibia with fibula (from above), anterior margin of tibia above. Superior articular surface of tibia.



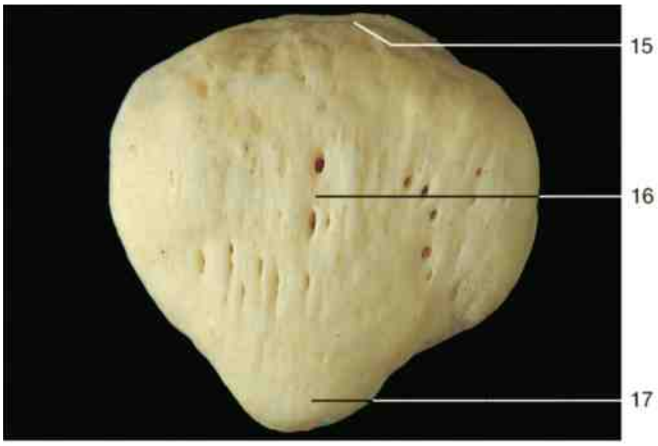
Bones of right knee joint (anterior aspect).



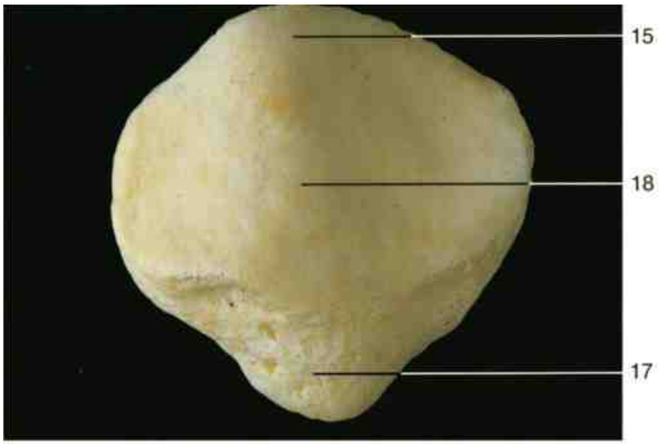
Bones of right knee joint (posterior aspect).



Bones of right knee joint (lateral aspect).

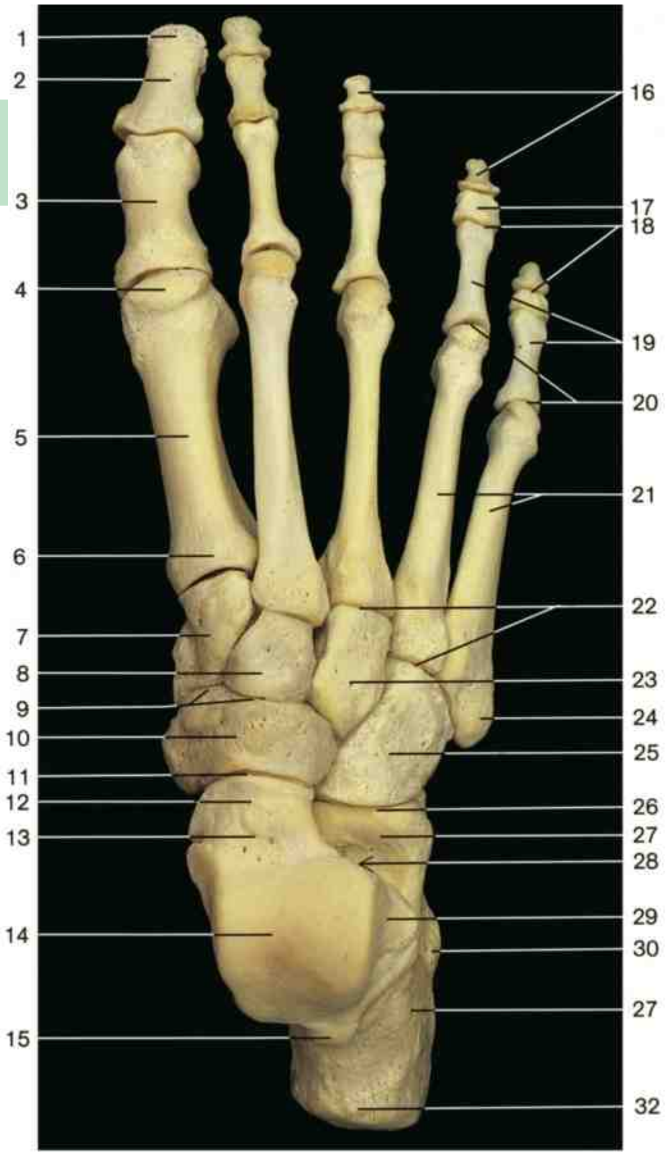


Right patella (anterior aspect).



Right patella (posterior aspect).

1	Femur
2	Patellar surface of femur
3	Lateral epicondyle of femur
4	Intercondylar eminence of tibia
5	Lateral condyle of tibia
6	Position of tibiofibular joint
7	Head of fibula
8	Tuberosity of tibia
9	Fibula
10	Shaft of tibia
11	Popliteal surface of femur
12	Intercondylar fossa of femur
13	Lateral condyle of femur
14	Patella
15	Base of patella
16	Anterior surface of patella
17	Apex of patella
18	Articular surface of patella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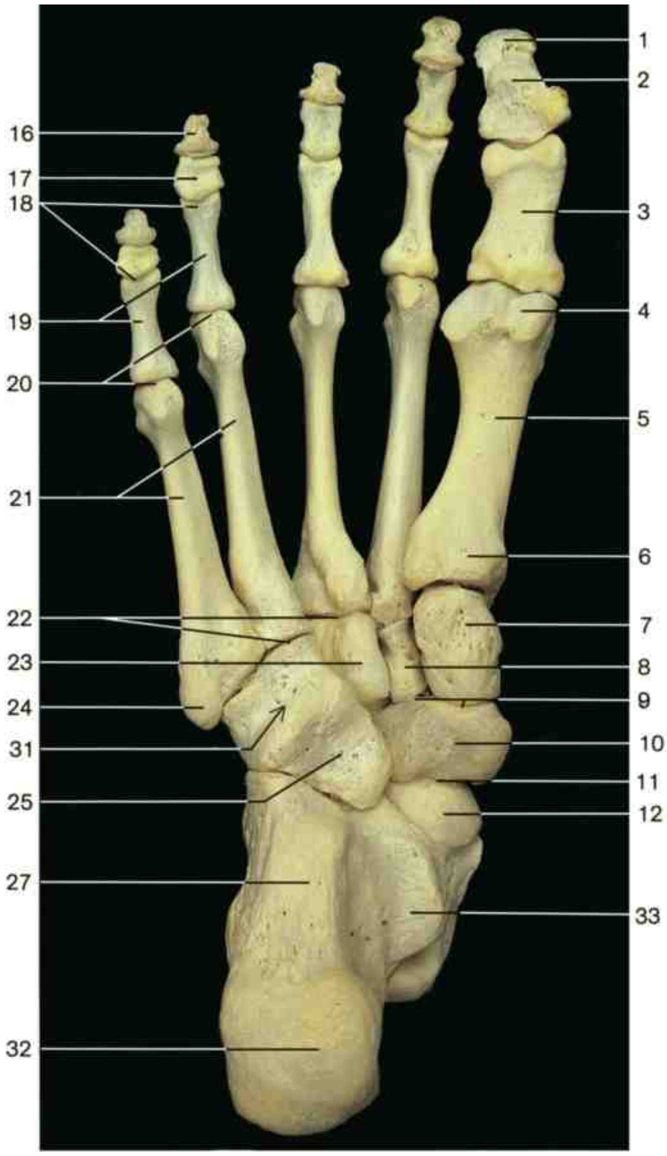
Bones of right foot (dorsal aspect).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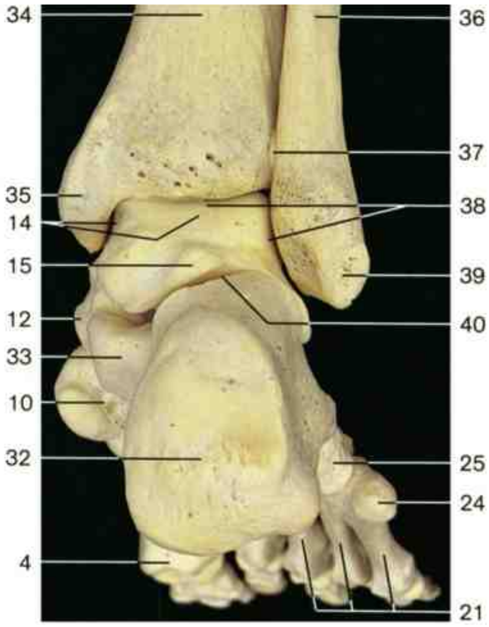
Bones of right foot (plantar aspect).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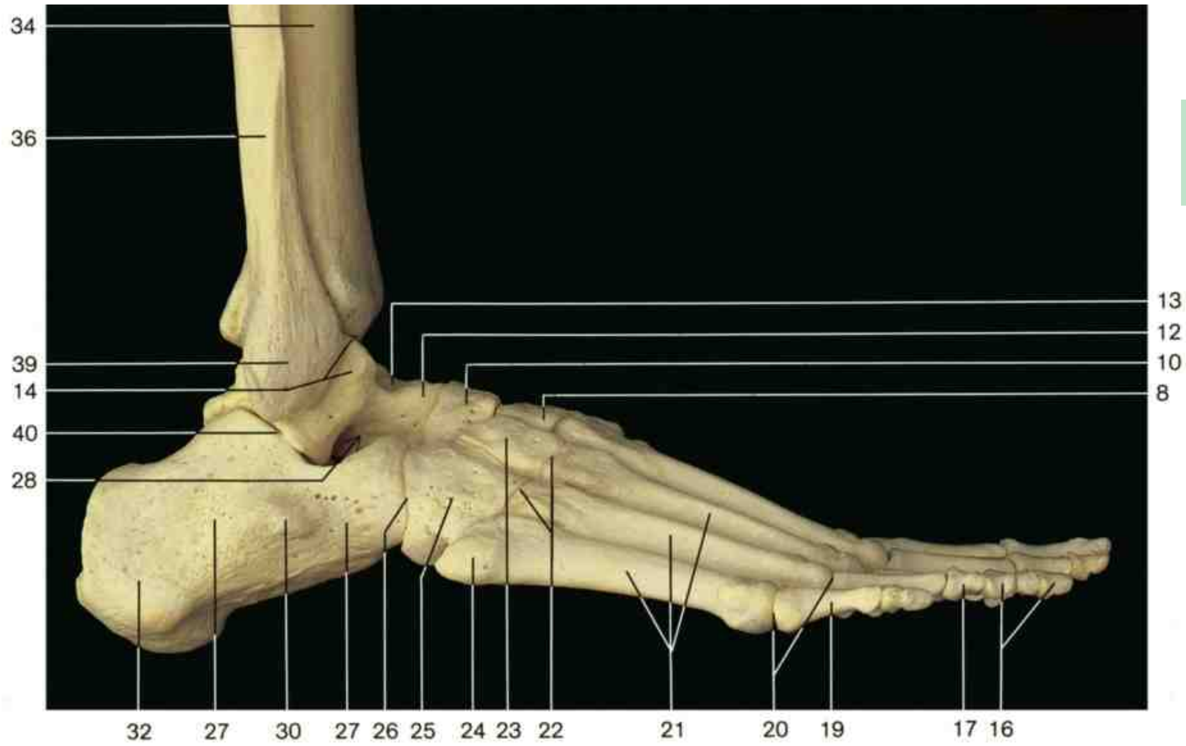
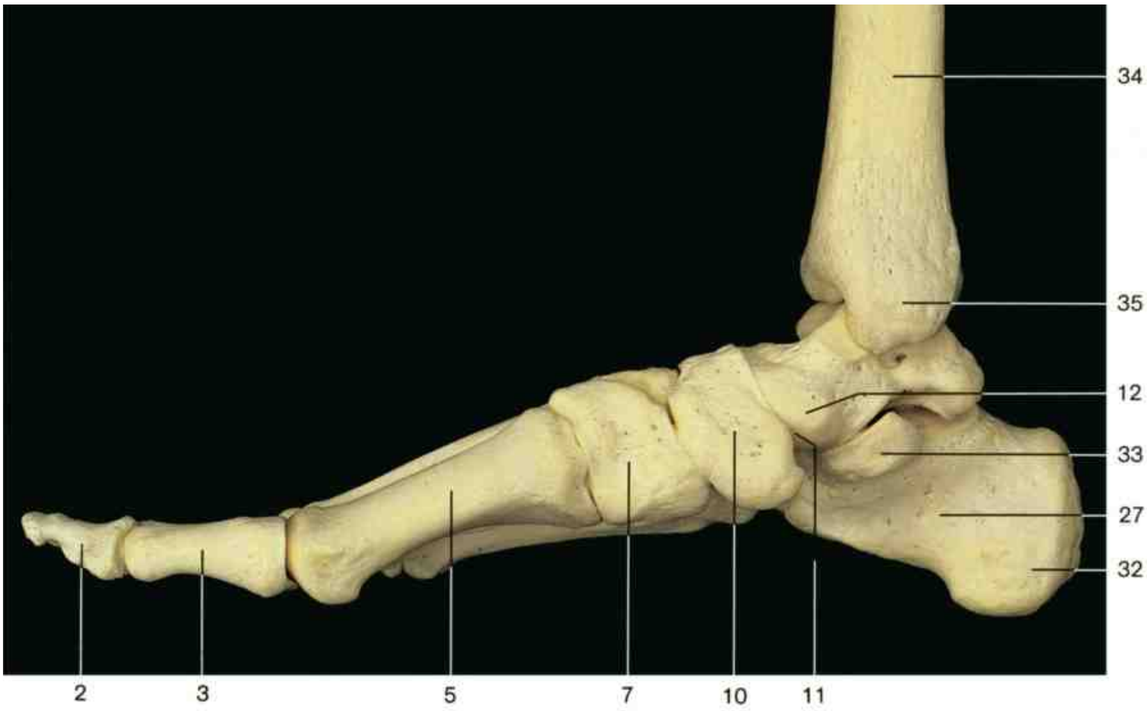
Bones of right foot together with tibia and fibula (posterior aspect).

1 Tuberosity of distal phalanx of great toe
2 Distal phalanx of great toe
3 Proximal phalanx of great toe
4 Head of first metatarsal bone
5 First metatarsal bone
6 Base of first metatarsal bone
7 Medial cuneiform bone
8 Intermediate cuneiform bone
9 Position of cuneonavicular joint
10 Navicular bone

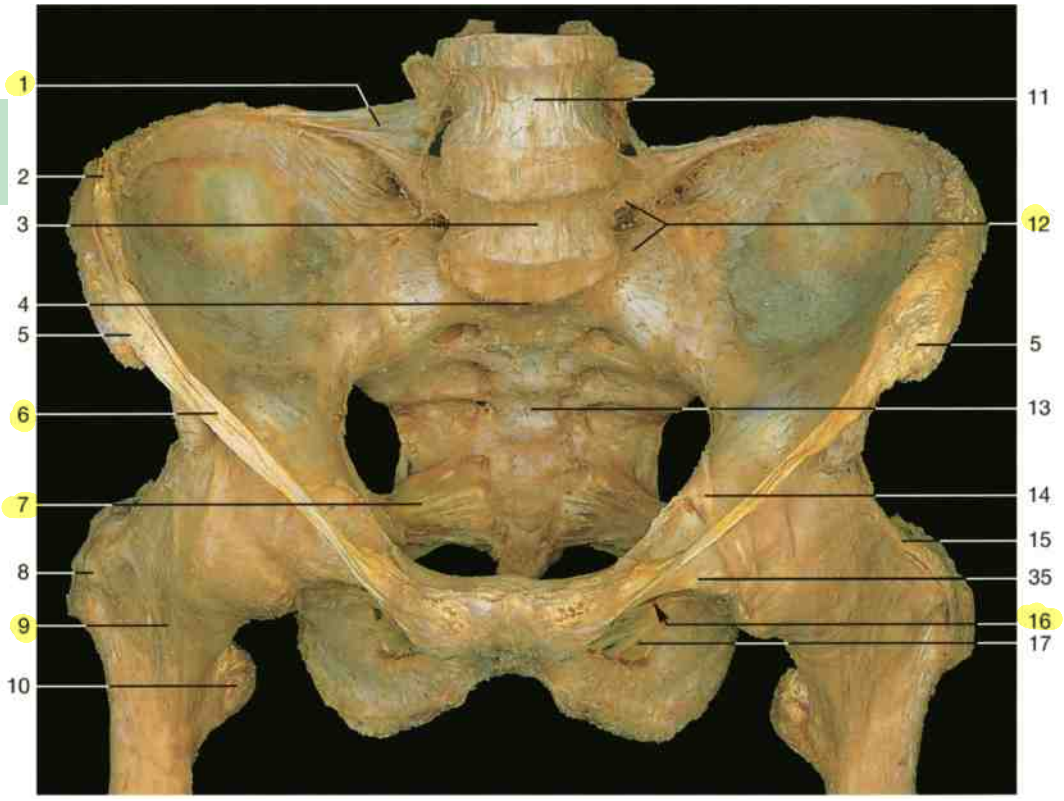


Bones of right foot, tibia, and fibula (lateral aspect).



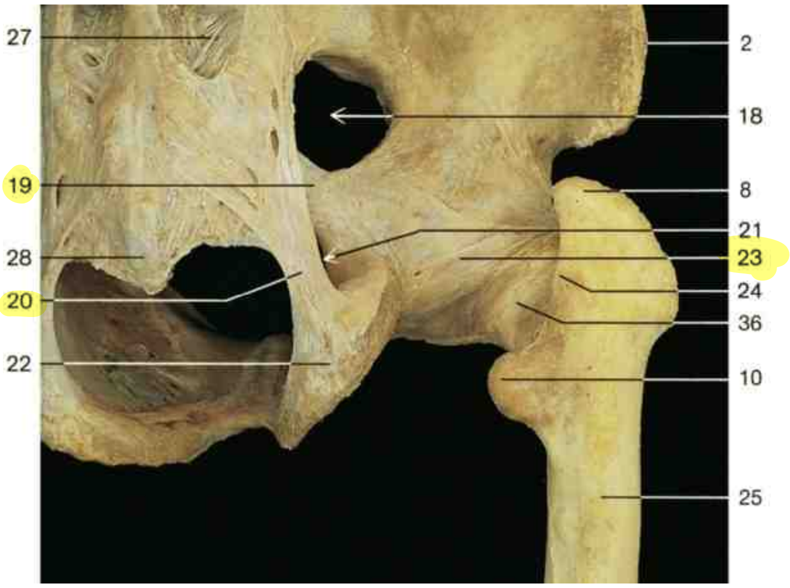
Bones of right foot, tibia, and fibula (medial aspect).

11 Position of talocalcaneonavicular joint
12 Head of talus
13 Neck of talus
14 Trochlea of talus
15 Posterior talar process
16 Distal phalanges
17 Middle phalanges
18 Position of interphalangeal joints
19 Proximal phalanges
20 Position of metatarsophalangeal joints
21 Metatarsal bones
22 Position of tarsometatarsal joints
23 Lateral cuneiform bone
24 Tuberosity of fifth metatarsal bone
25 Cuboid bone
26 Position of calcaneocuboid joint
27 Calcaneus
28 Tarsal sinus
29 Lateral malleolar surface of talus
30 Peroneal trochlea of calcaneus
31 Groove for tendon of peroneus longus
32 Calcaneal tuberosity
33 Sustentaculum tali
34 Tibia
35 Medial malleolus
36 Fibula
37 Position of tibiofibular syndesmosis
38 Position of ankle joint
39 Lateral malleolus
40 Position of subtalar joint

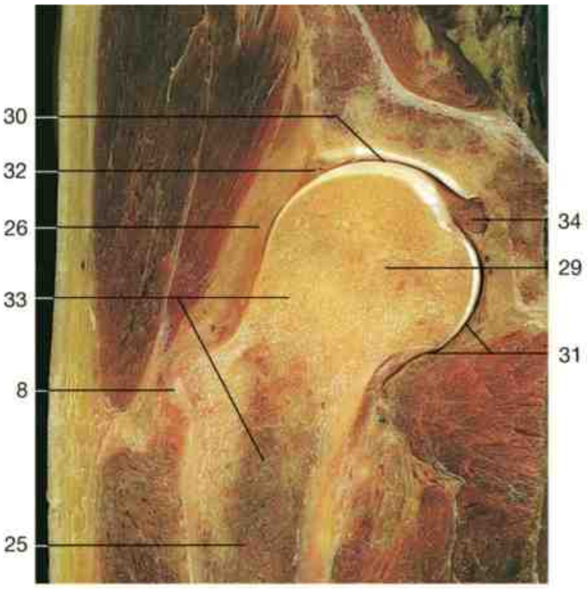


Ligaments of pelvis and hip joint (anterior aspect).

1 Iliolumbar ligament
2 Iliac crest
3 Fifth lumbar vertebra
4 Sacral promontory
5 Anterior superior iliac spine
6 Inguinal ligament
7 Sacrospinous ligament
8 Greater trochanter
9 Iliofemoral ligament (vertical band)
10 Lesser trochanter
11 Fourth lumbar vertebra
12 Iliolumbar and ventral sacro-iliac ligaments
13 Sacrum
14 Iliopectineal arch
15 Iliofemoral ligament (horizontal band)
16 Obturator canal
17 Obturator membrane
18 Greater sciatic foramen
19 Sacrospinous ligament
20 Sacrotuberous ligament
21 Lesser sciatic foramen
22 Ischial tuberosity
23 Ischiofemoral ligament
24 Intertrochanteric crest
25 Femur
26 Articular capsule of hip joint
27 Dorsal sacro-iliac ligaments
28 Coccyx with superficial dorsal sacrococcygeal ligament
29 Head of femur
30 Articular cartilage of head of femur
31 Articular cavity of hip joint
32 Acetabular lip
33 Spongy bone
34 Ligament of head of femur
35 Pubofemoral ligament
36 Zona orbicularis

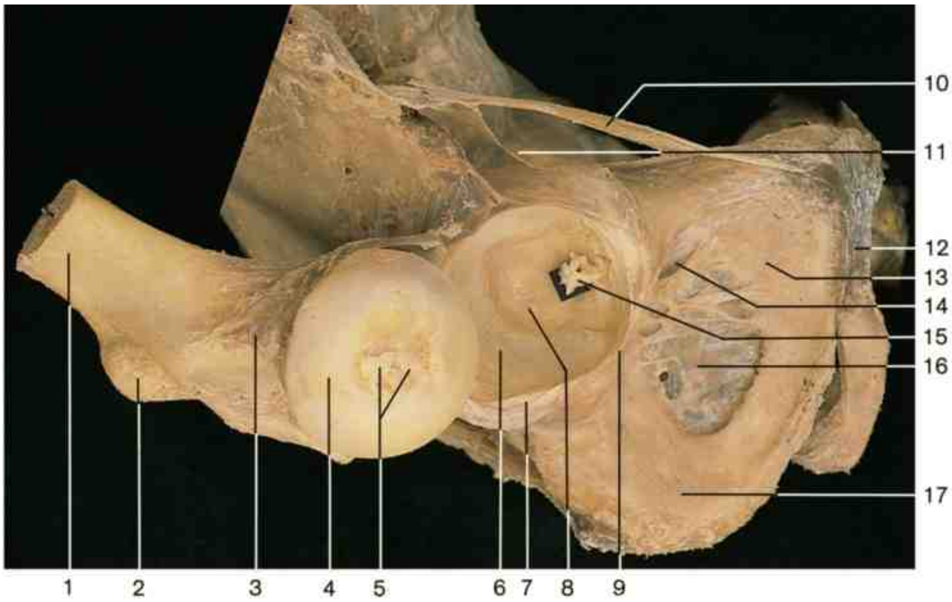


Ligaments of pelvis and hip joint (right posterior aspect).

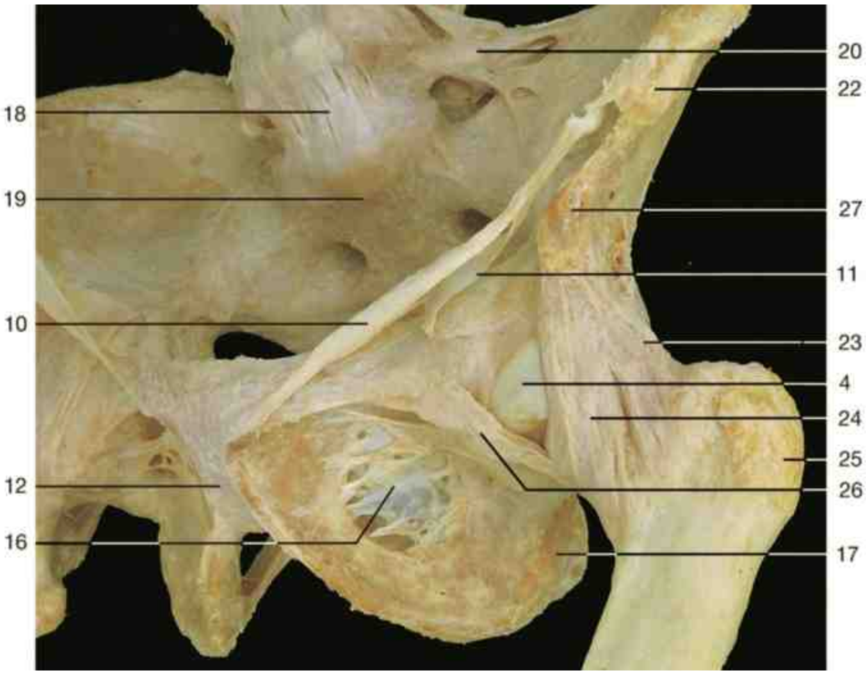


Coronal section of right hip joint (anterior aspect).

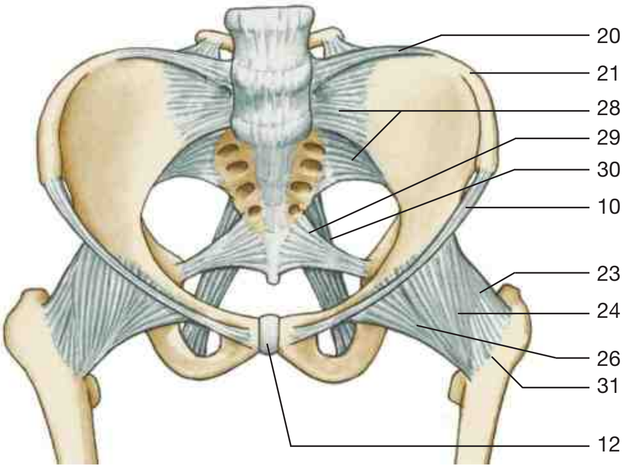
1	Femur
2	Lesser trochanter
3	Neck of femur
4	Head of femur
5	Fovea of head with cut edge of ligament of head
6	Lunate surface of acetabulum
7	Acetabular lip
8	Acetabular fossa
9	Transverse acetabular ligament
10	Inguinal ligament
11	Iliopectineal arch
12	Pubic symphysis
13	Pubic bone
14	Obturator canal
15	Ligament of head of femur
16	Obturator membrane
17	Ischium
18	Anterior longitudinal ligament (level of fifth lumbar vertebra)
19	Sacral promontory
20	Iliolumbar ligament
21	Iliac crest
22	Anterior superior iliac spine
23	Iliofemoral ligament (horizontal band)
24	Iliofemoral ligament (vertical band)
25	Greater trochanter
26	Pubofemoral ligament
27	Anterior inferior iliac spine
28	Ventral sacro-iliac ligaments
29	Sacrospinous ligament
30	Sacrotuberous ligament
31	Intertrochanteric line
32	Ischiofemoral ligament
33	Zona orbicularis



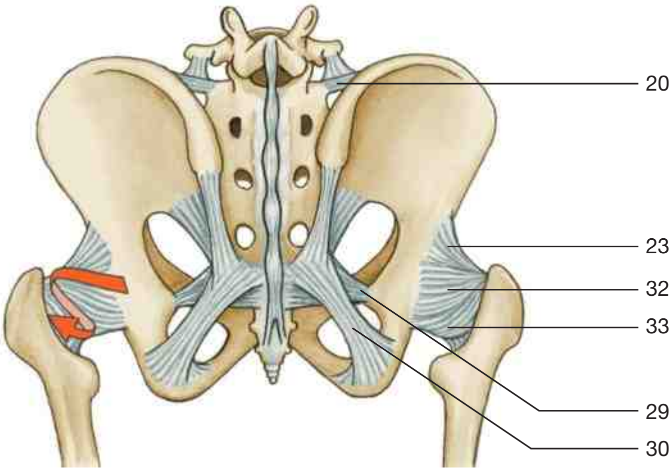
Right hip joint, opened (latero-anterior aspect). The ligament of the head of the femur has been divided, and the femur has been posteriorly reflected.



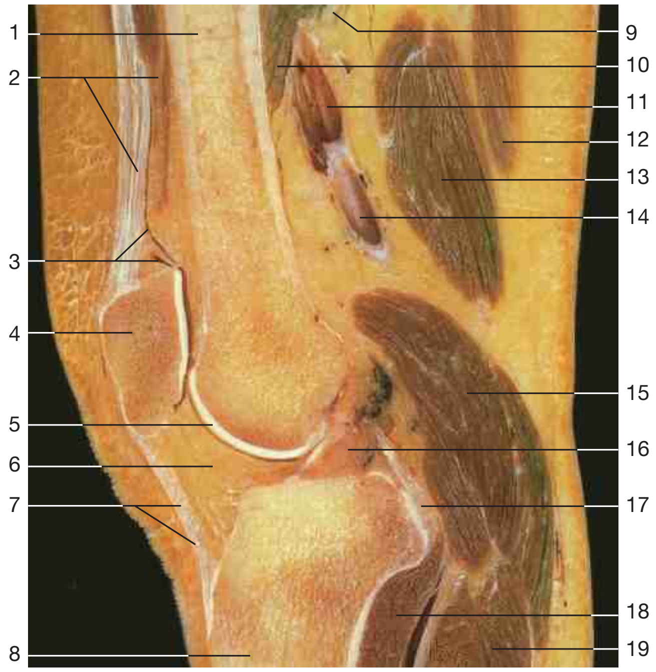
◁ **Ligaments of the pelvis and hip joint** (antero-lateral aspect).



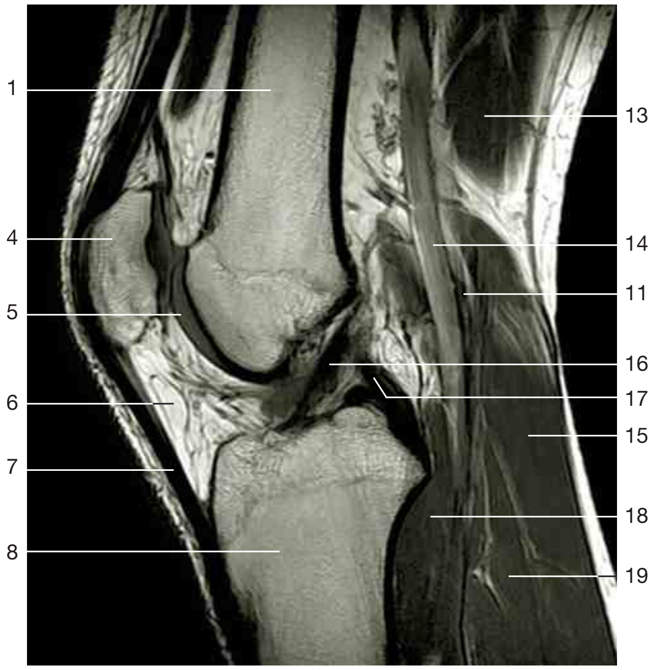
Ligaments of hip joint (anterior aspect, schematic drawing).



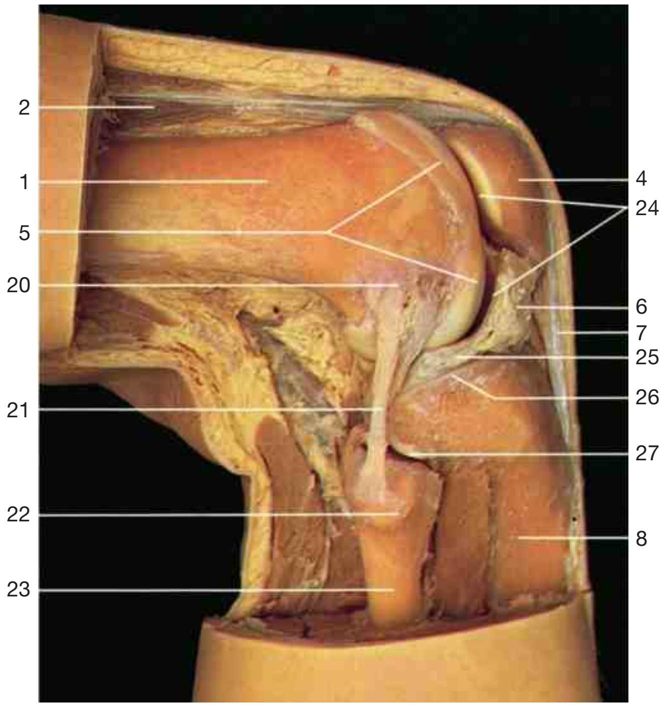
Ligaments of hip joint (posterior aspect, schematic drawing).



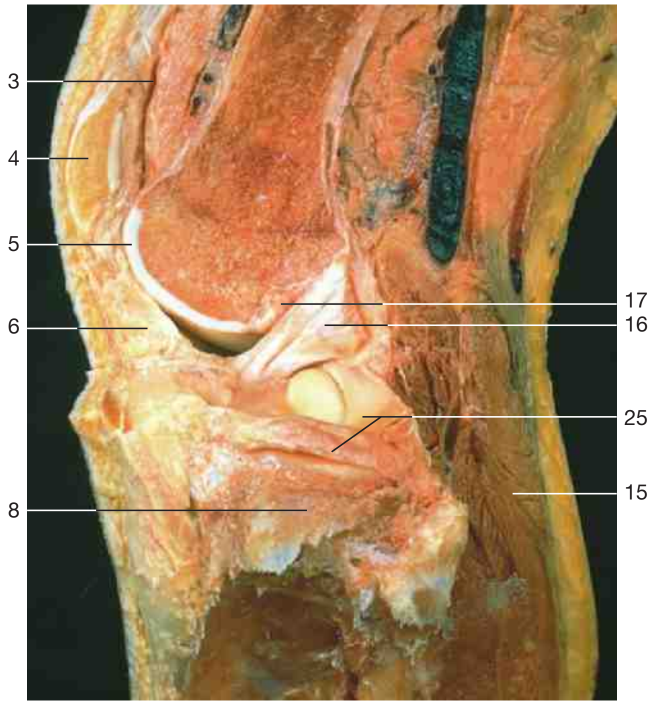
Sagittal section through the knee joint (lateral aspect). Anterior surface to the left.



Sagittal section through the knee joint (MRI scan; from Heuck et al., MRT-Atlas, 2009).

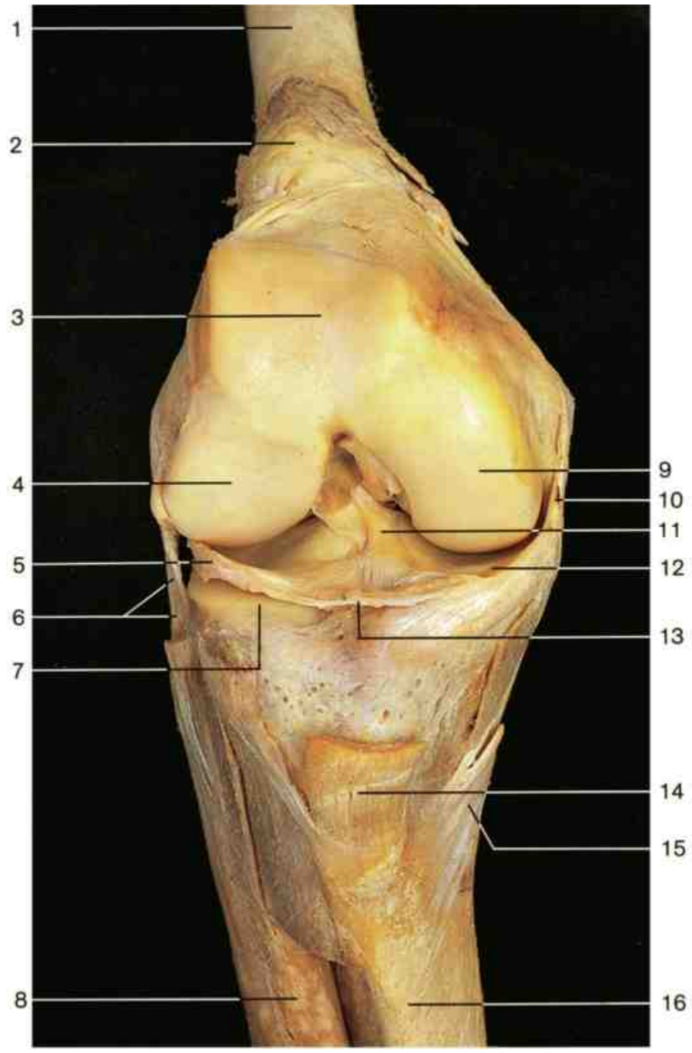


Right knee joint and tibiofibular joint with ligaments (lateral aspect). Note the position of the lateral meniscus.

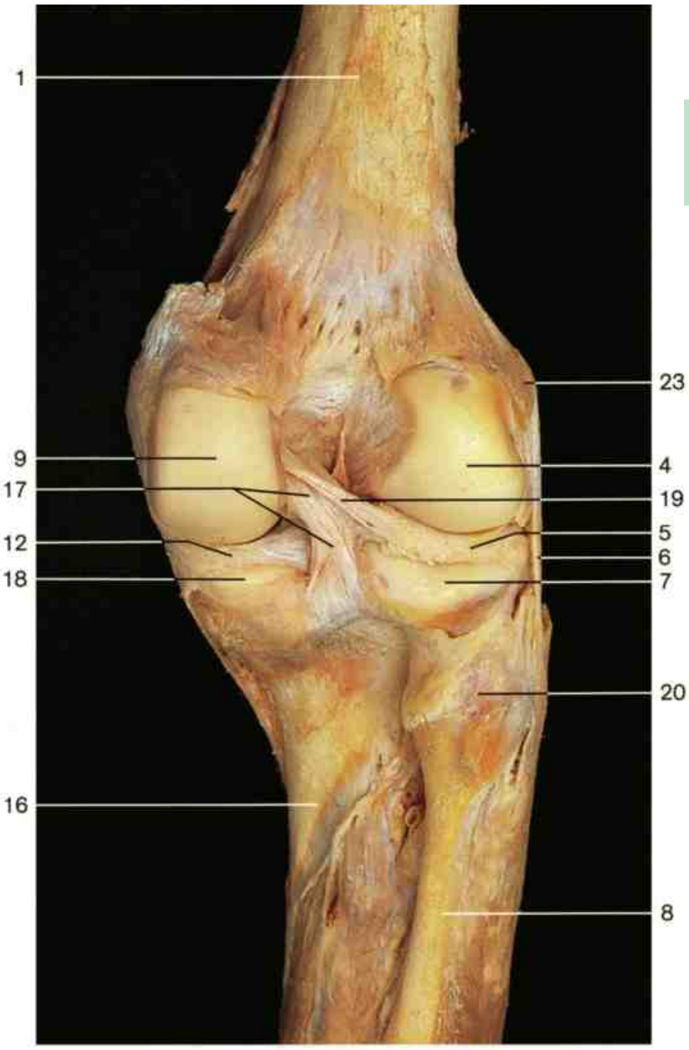


Left knee joint with anterior cruciate ligament (lateral aspect).

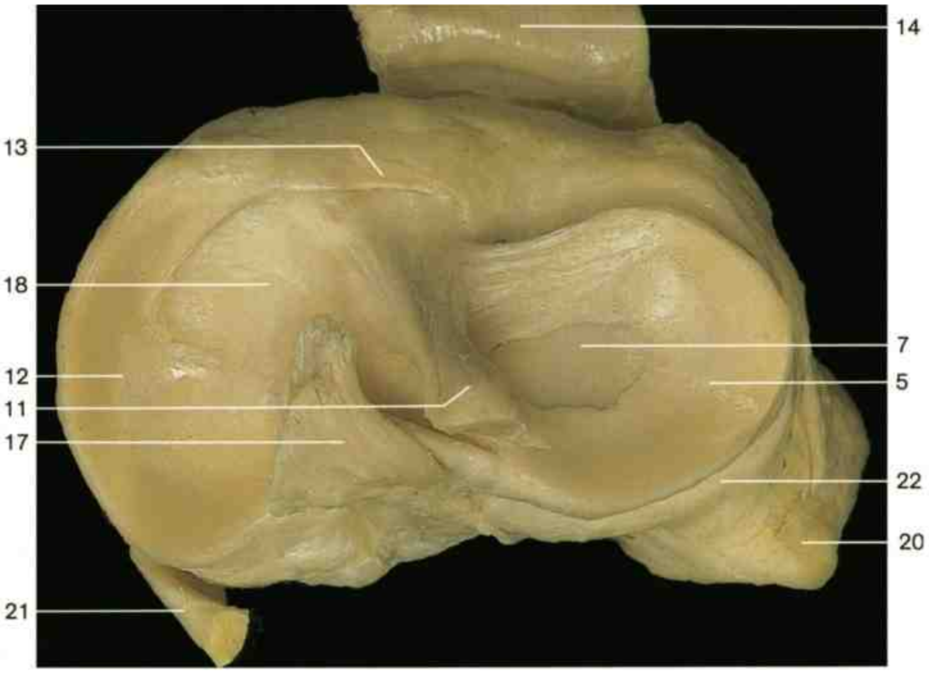
1	Femur
2	Quadriceps femoris muscle
3	Suprapatellar bursa and articular cavity
4	Patella
5	Articular cartilage of femur
6	Infrapatellar fat pad
7	Patellar ligament
8	Tibia
9	Tibial nerve
10	Adductor magnus muscle
11	Popliteal vein
12	Semitendinosus muscle
13	Semimembranosus muscle
14	Popliteal artery
15	Gastrocnemius muscle
16	Anterior cruciate ligament
17	Posterior cruciate ligament
18	Popliteus muscle
19	Soleus muscle
20	Lateral epicondyle of femur
21	Fibular collateral ligament
22	Head of fibula
23	Fibula
24	Articular cavity of knee joint
25	Lateral meniscus of knee joint
26	Lateral condyle of tibia
27	Tibiofibular joint



Right knee joint (opened) **with ligaments** (anterior aspect). The patella and articular capsule have been removed and the femur slightly flexed.

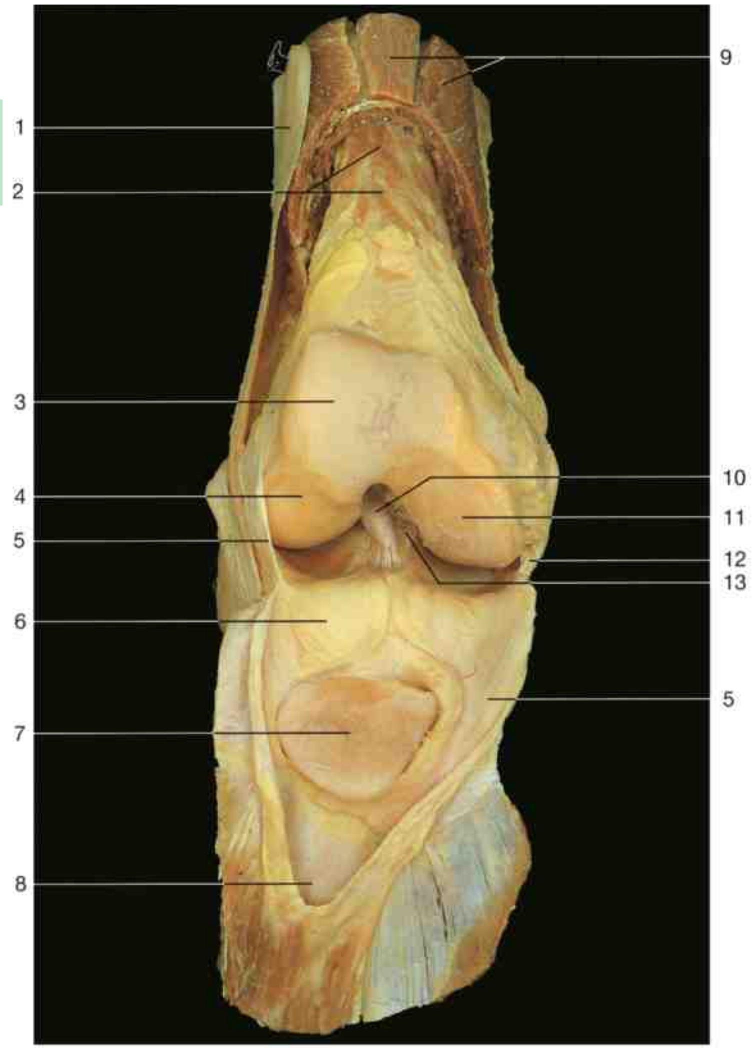


Right knee joint with ligaments (posterior aspect). The joint is extended and the articular capsule has been removed.

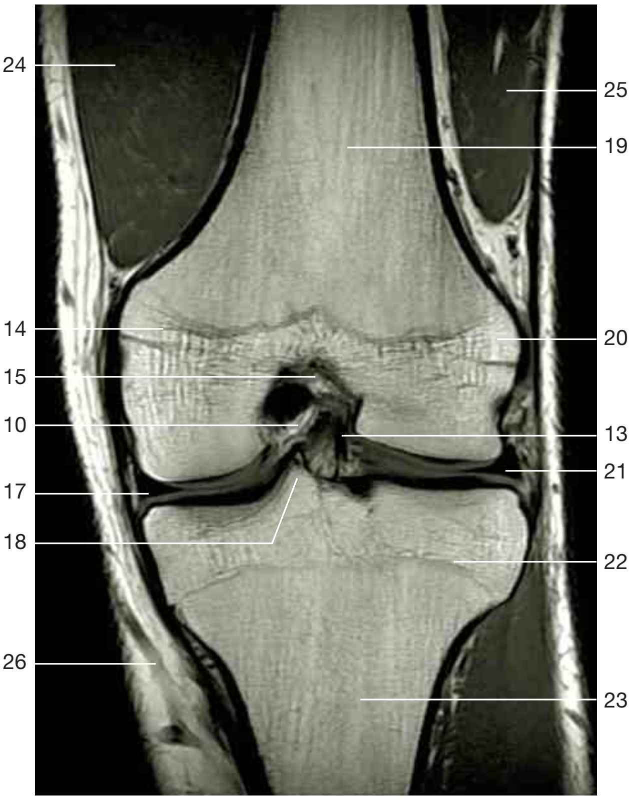


Articular surface of right tibia, menisci, and cruciate ligaments (superior aspect). Anterior margin of tibia above.

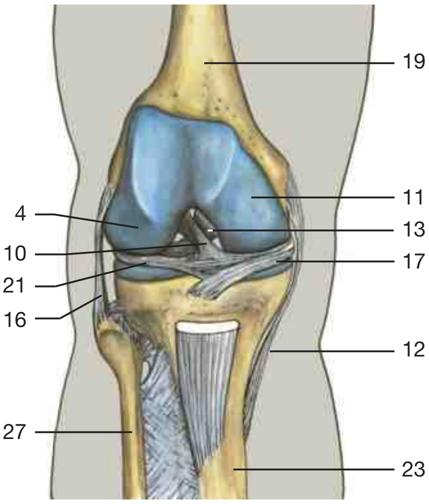
1	Femur
2	Articular capsule with suprapatellar bursa
3	Patellar surface
4	Lateral condyle of femur
5	Lateral meniscus of knee joint
6	Fibular collateral ligament
7	Lateral condyle of tibia (superior articular surface)
8	Fibula
9	Medial condyle of femur
10	Tibial collateral ligament
11	Anterior cruciate ligament
12	Medial meniscus of knee joint
13	Transverse ligament of knee
14	Patellar ligament
15	Common tendon of sartorius, semitendinosus, and gracilis muscles
16	Tibia
17	Posterior cruciate ligament
18	Medial condyle of tibia (superior articular surface)
19	Posterior meniscofemoral ligament
20	Head of fibula
21	Tendon of semimembranosus muscle
22	Posterior attachment of articular capsule of knee joint
23	Lateral epicondyle of femur



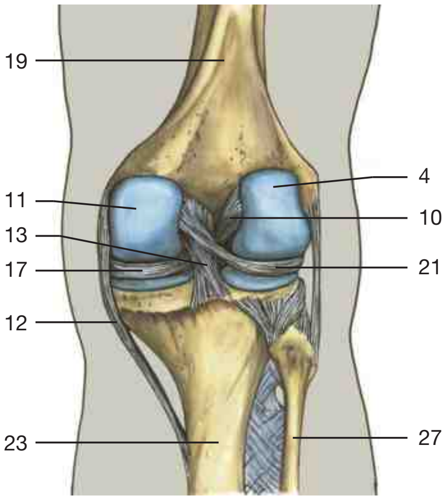
Right knee joint, opened (anterior aspect). Patellar ligament with patella reflected.



Coronal section through the knee joint (MRI scan; from Heuck et al., MRT-Atlas, 2009).

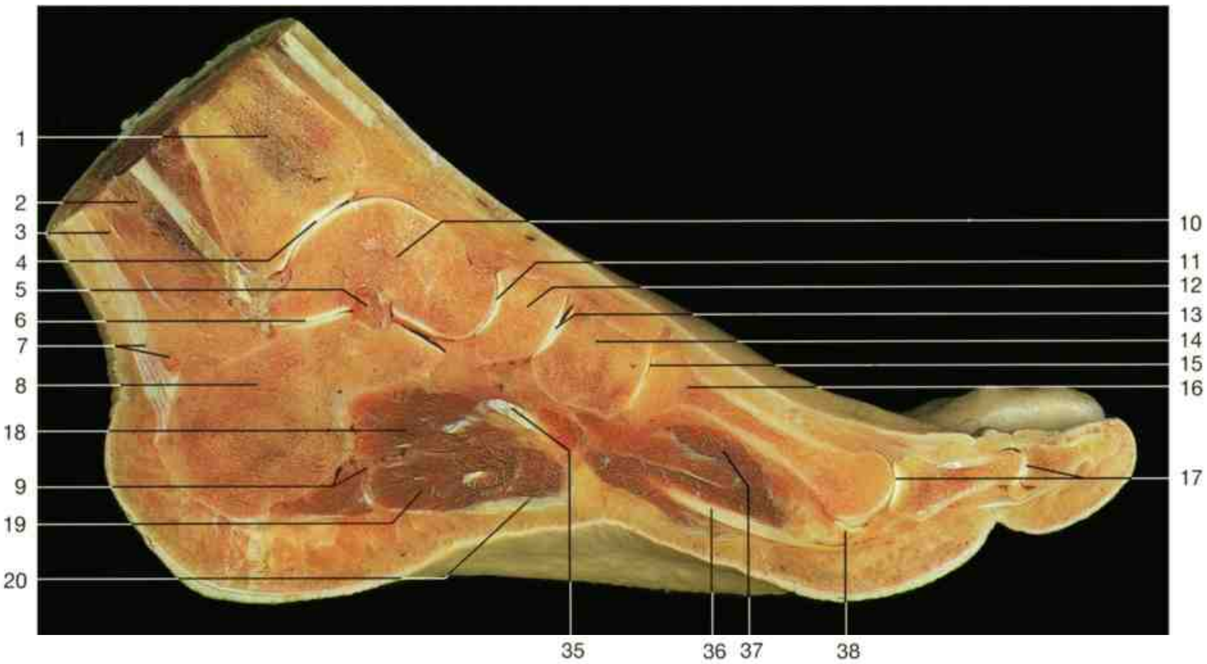


Ligaments of the right knee joint (anterior aspect).

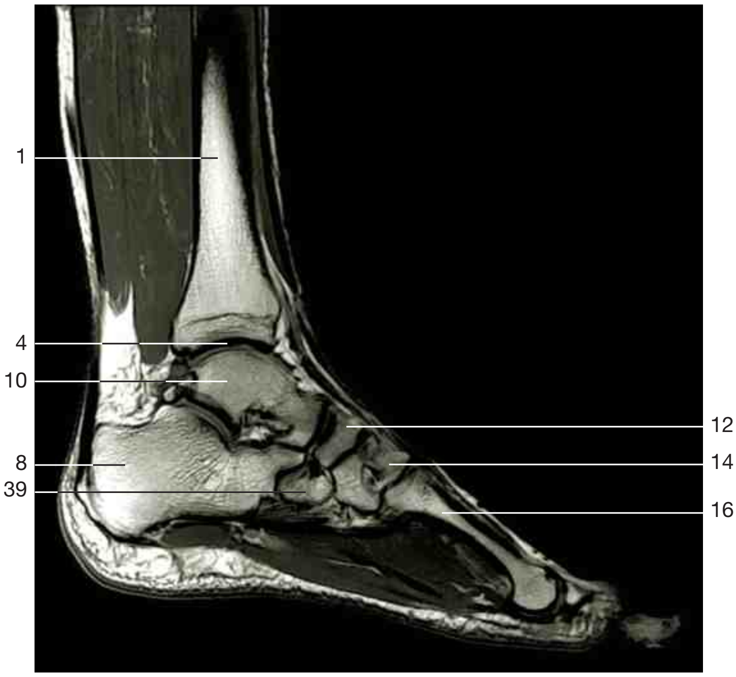


Ligaments of the right knee joint (posterior aspect).

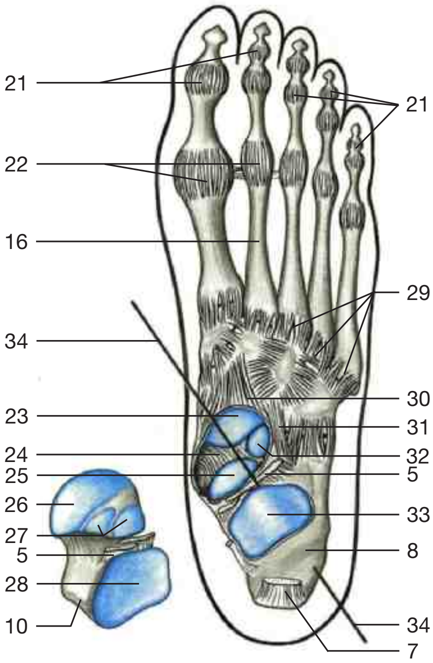
1	Iliotibial tract
2	Articular muscle of knee
3	Patellar surface
4	Lateral condyle of femur
5	Articular capsule
6	Infrapatellar fat pad
7	Patella (articular surface)
8	Suprapatellar bursa
9	Quadriceps femoris muscle
10	Anterior cruciate ligament
11	Medial condyle of femur
12	Tibial collateral ligament
13	Posterior cruciate ligament
14	Medial epicondyle of femur
15	Intercondylar fossa of femur
16	Fibular collateral ligament
17	Medial meniscus of knee joint
18	Medial intercondylar tubercle
19	Femur
20	Lateral epicondyle of femur
21	Lateral meniscus of knee joint
22	Epiphysial line of tibia
23	Tibia
24	Vastus medialis muscle
25	Vastus lateralis muscle
26	Great saphenous vein
27	Fibula



Sagittal section through the foot at the level of first phalanx.

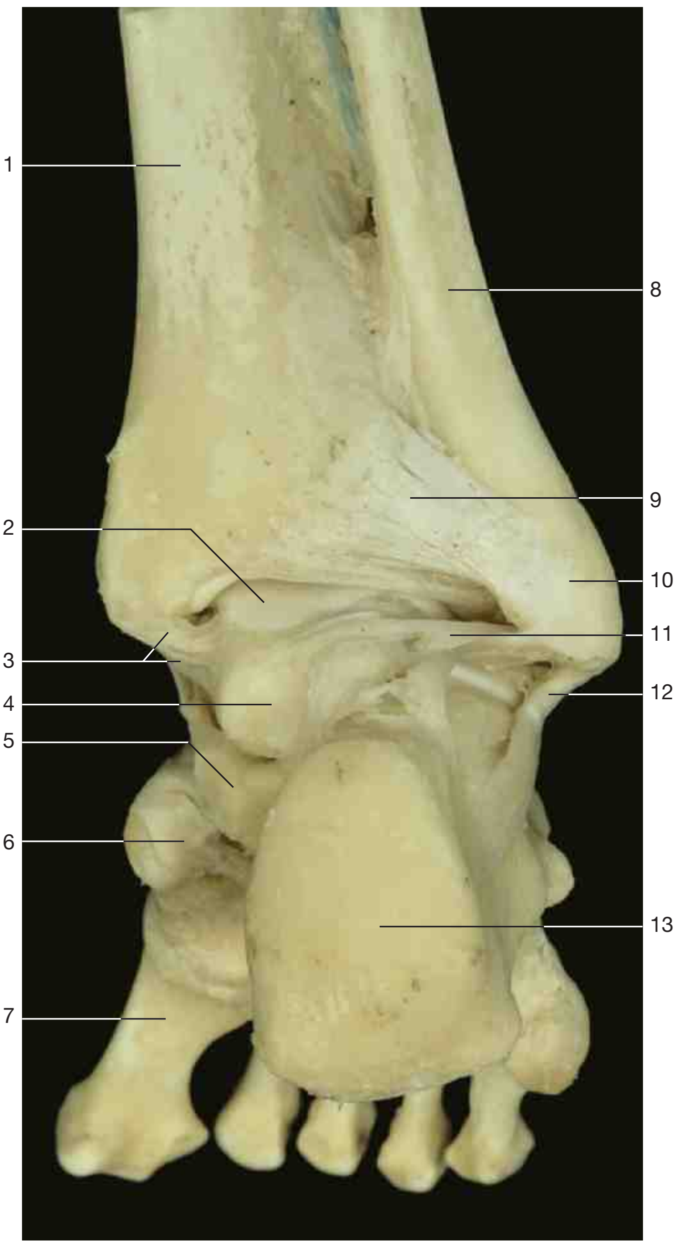


Sagittal section through the foot and leg (MRI scan; from Heuck et al., MRT-Atlas, 2009).

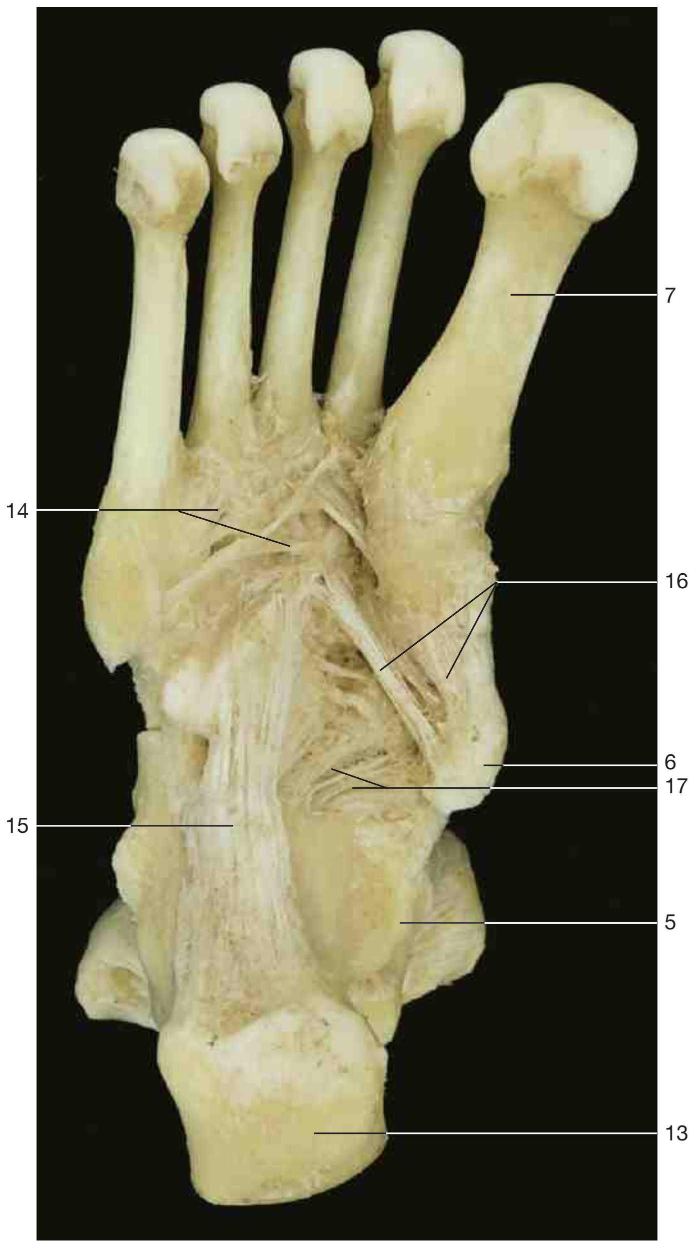


Talocalcaneonavicular joint. The talus has been rotated to show the articular surfaces of the joint.

1 Tibia
2 Deep flexor muscles
3 Superficial flexor muscles
4 Ankle joint
5 Interosseous talocalcaneal ligament
6 Subtalar joint
7 Calcaneal or Achilles tendon and bursa
8 Calcaneus
9 Vessels and nerves of foot
10 Talus
11 Talocalcaneonavicular joint
12 Navicular bone
13 Cuneonavicular joint
14 Intermediate cuneiform bone
15 Tarsometatarsal joints
16 Metatarsal bones
17 Metatarsophalangeal and interphalangeal joints
18 Quadratus plantae muscle with flexor tendons
19 Flexor digitorum brevis muscle
20 Plantar aponeurosis
21 Articular capsules of interphalangeal joints
22 Articular capsules of metatarsophalangeal joints
23 Articular surface of navicular bone
24 Plantar calcaneonavicular ligament
25 Middle talar articular surface of calcaneus
26 Navicular articular surface of talus
27 Anterior and middle calcaneal surfaces of talus
28 Posterior calcaneal surface of talus
29 Dorsal tarsometatarsal ligaments
30 Talonavicular ligament
31 Bifurcate ligament
32 Anterior talar articular surface of calcaneus
33 Posterior talar articular surface of calcaneus
34 Axis for inversion and eversion
35 Tendon of tibialis posterior muscle
36 Tendon of flexor hallucis longus muscle
37 Flexor hallucis brevis muscle
38 Sesamoid bone
39 Cuboid bone

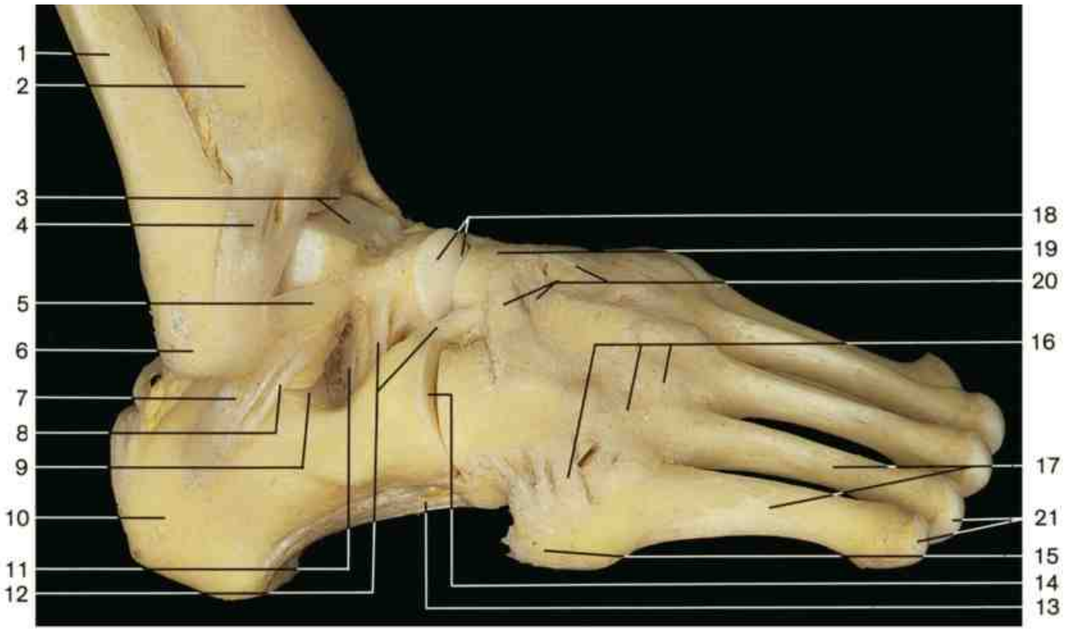


Ligaments of ankle joint, right foot (posterior aspect).

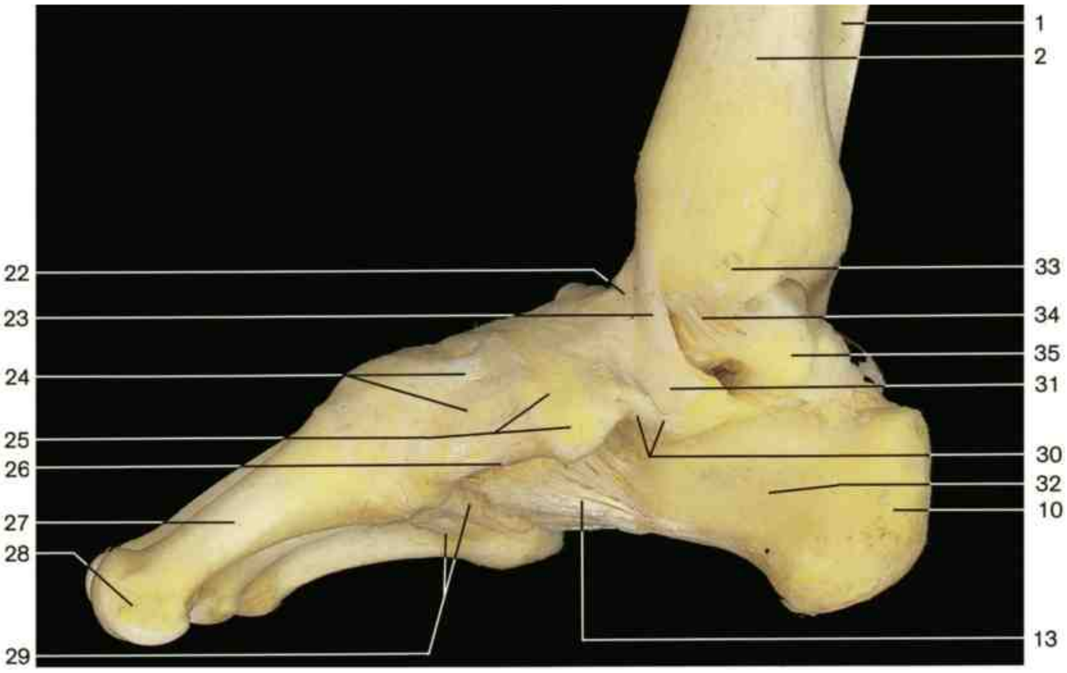


Deep ligaments of the foot, right foot (plantar aspect). The toes have been removed.

1	Tibia
2	Trochlea of talus
3	Deltoid ligament of ankle (posterior tibiotalar part)
4	Talus
5	Sustentaculum tali
6	Navicular bone
7	First metatarsal bone
8	Fibula
9	Posterior tibiofibular ligament
10	Lateral malleolus
11	Posterior talofibular ligament
12	Calcaneofibular ligament
13	Calcaneal tuberosity
14	Plantar tarsometatarsal ligaments
15	Long plantar ligament
16	Plantar cuneonavicular ligaments
17	Plantar calcaneonavicular ligament

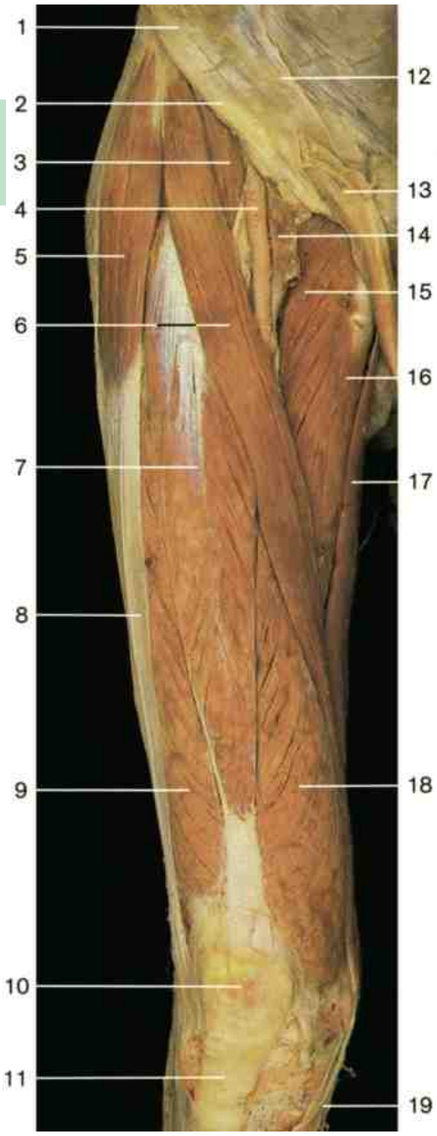


Ligaments of right foot (lateral aspect).

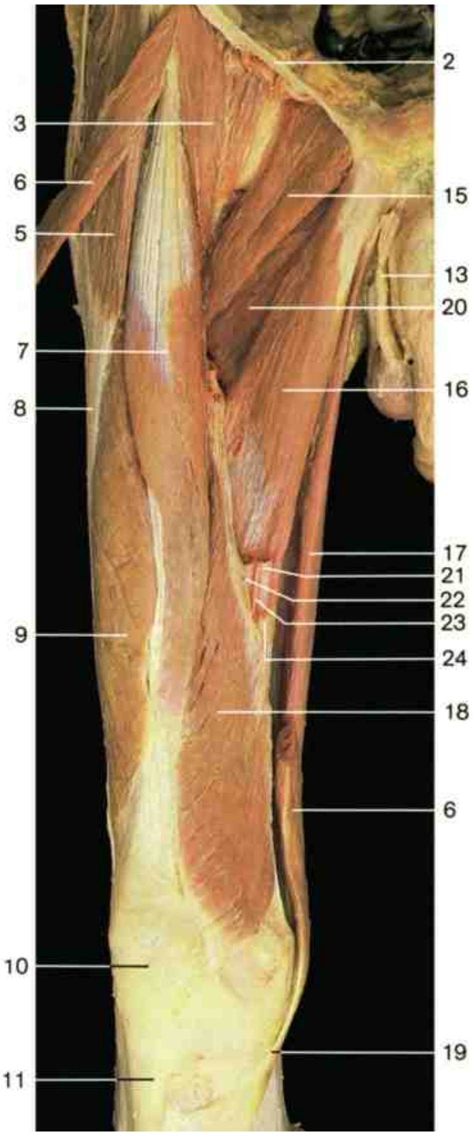


Ligaments of right foot (medial aspect).

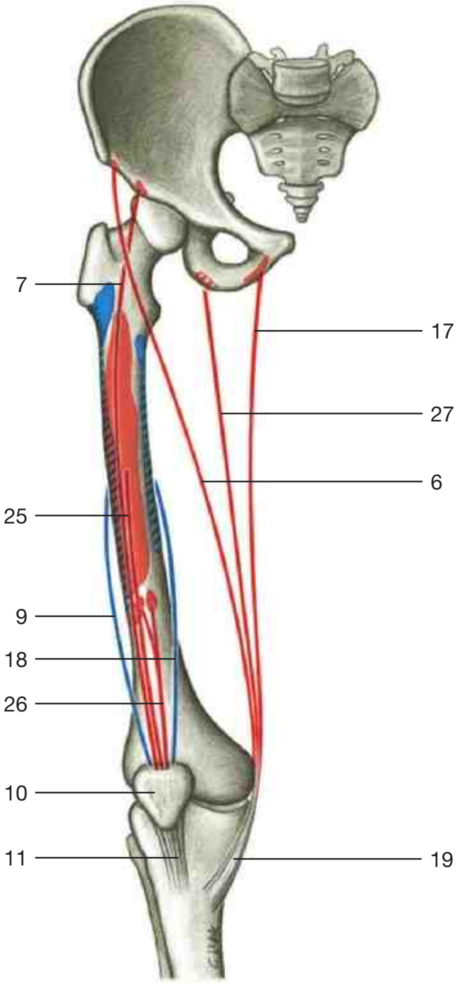
1	Fibula
2	Tibia
3	Trochlea of talus and ankle joint
4	Anterior tibiofibular ligament
5	Anterior talofibular ligament
6	Lateral malleolus
7	Calcaneofibular ligament
8	Lateral talocalcaneal ligament
9	Subtalar joint
10	Tuber calcanei
11	Interosseous talocalcaneal ligament
12	Bifurcate ligament
13	Long plantar ligament
14	Calcaneocuboid joint
15	Tuberosity of fifth metatarsal bone
16	Dorsal tarsometatarsal ligaments
17	Metatarsal bones
18	Head of talus and talocalcaneonavicular joint
19	Navicular bone
20	Dorsal cuneonavicular ligaments
21	Heads of metatarsal bones
22	Medial or deltoid ligament of ankle (tibionavicular part)
23	Medial or deltoid ligament of ankle (tibiocalcaneal part)
24	Dorsal cuneonavicular ligaments
25	Navicular bone
26	Plantar cuneonavicular ligament
27	First metatarsal bone
28	Head of first metatarsal bone
29	Plantar tarsometatarsal ligaments
30	Plantar calcaneonavicular ligament
31	Sustentaculum tali
32	Calcaneus
33	Medial malleolus
34	Medial or deltoid ligament of ankle (posterior part)
35	Talus



Extensor and adductor muscles of thigh, right thigh (anterior aspect).



Quadriceps muscle and superficial layer of adductor muscles, right thigh (anterior aspect). The sartorius muscle has been divided.

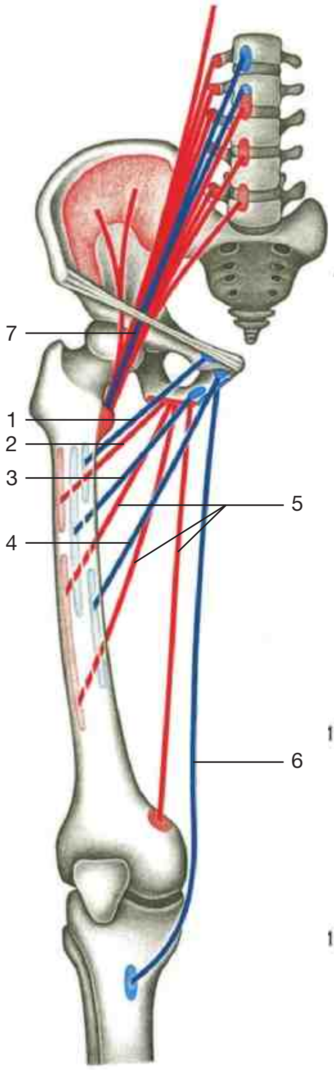


Course of extensor muscles of thigh and muscles inserting with common tendon on tibia (schematic drawing).

1 Anterior superior iliac spine
2 Inguinal ligament
3 Iliopsoas muscle
4 Femoral artery
5 Tensor fasciae latae muscle
6 Sartorius muscle
7 Rectus femoris muscle
8 Iliotibial tract
9 Vastus lateralis muscle
10 Patella
11 Patellar ligament

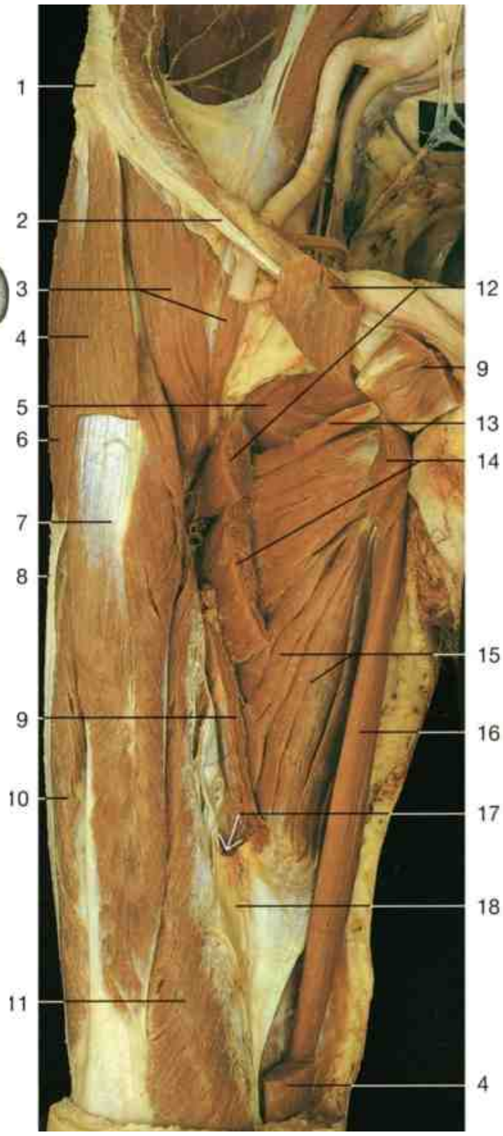
12 Aponeurosis of external abdominal oblique muscle
13 Spermatic cord
14 Femoral vein
15 Pectineus muscle
16 Adductor longus muscle
17 Gracilis muscle
18 Vastus medialis muscle
19 Common tendon of sartorius, gracilis, and semitendinosus muscles (pes anserinus)

20 Adductor brevis muscle
21 Femoral artery
22 Femoral vein } entering the adductor canal
23 Saphenous nerve
24 Fascia of adductor canal
25 Vastus intermedius muscle
26 Articularis genus muscle
27 Semitendinosus muscle



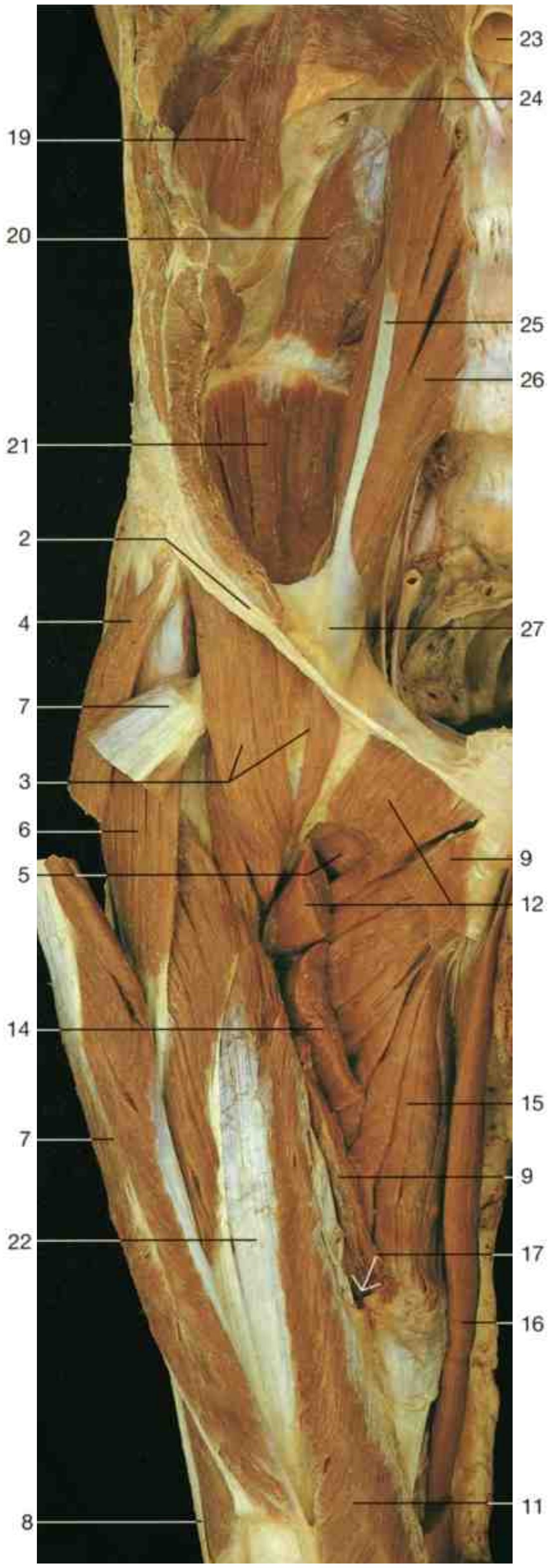
Course of adductor muscles (schematic drawing).

1 Pectineus muscle (blue)
2 Adductor minimus muscle (red)
3 Adductor brevis muscle (blue)
4 Adductor longus muscle (blue)
5 Adductor magnus muscle (red)
6 Gracilis muscle (blue)
7 Iliopsoas muscle (red/blue)



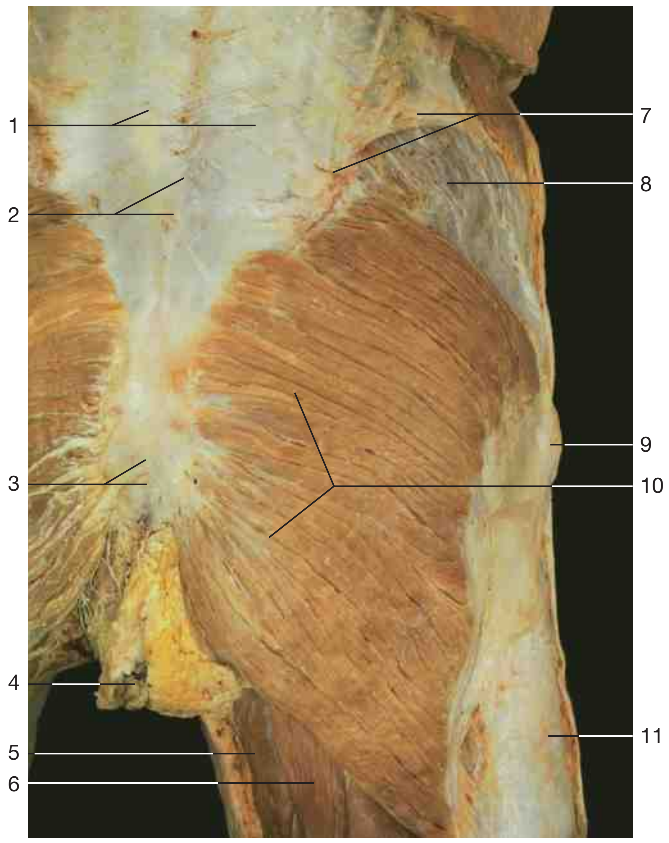
Adductor magnus muscle and deep layer of adductor muscles, right thigh (anterior aspect). Pectineus, adductor longus, and brevis muscles have been divided.

1 Anterior superior iliac spine
2 Inguinal ligament
3 Iliopsoas muscle
4 Sartorius muscle
5 Obturator externus muscle
6 Tensor fasciae latae muscle
7 Rectus femoris muscle
8 Iliotibial tract
9 Adductor longus muscle (divided)
10 Vastus lateralis muscle
11 Vastus medialis muscle
12 Pectineus muscle (divided)
13 Adductor minimus muscle
14 Adductor brevis muscle (cut)
15 Adductor magnus muscle
16 Gracilis muscle
17 Adductor hiatus
18 Vasto-adductor membrane
19 Diaphragm
20 Quadratus lumborum muscle
21 Iliacus muscle
22 Vastus intermedius muscle



Iliopsoas muscle and deepest layer of adductor muscles, right thigh (anterior aspect). Pectineus, adductor longus and brevis, and rectus femoris muscles have been divided.

23 Aorta in aortic hiatus
24 Twelfth rib
25 Psoas minor muscle
26 Psoas major muscle
27 Iliopectineal arch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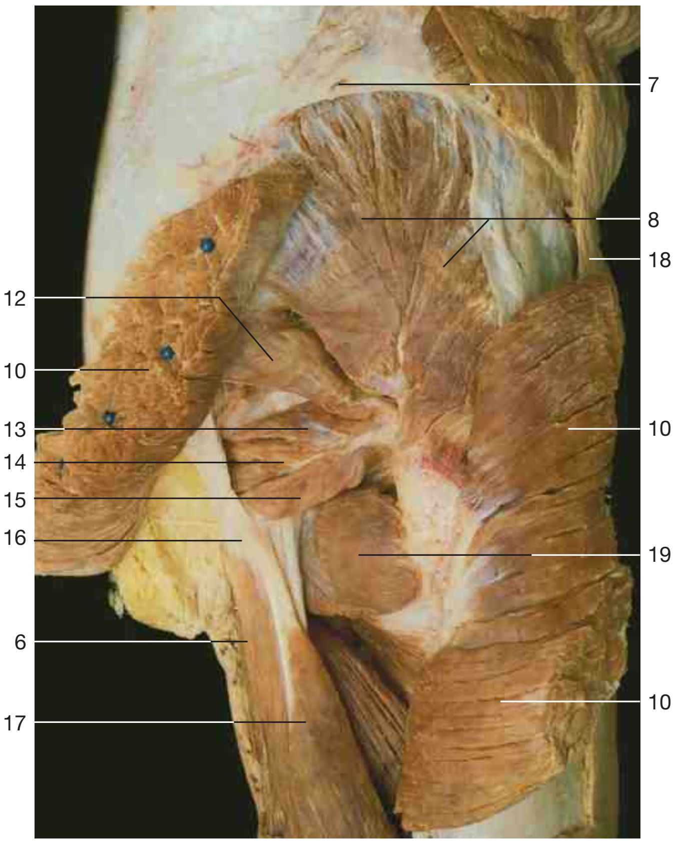
Gluteal muscles, superficial layer (posterior aspect).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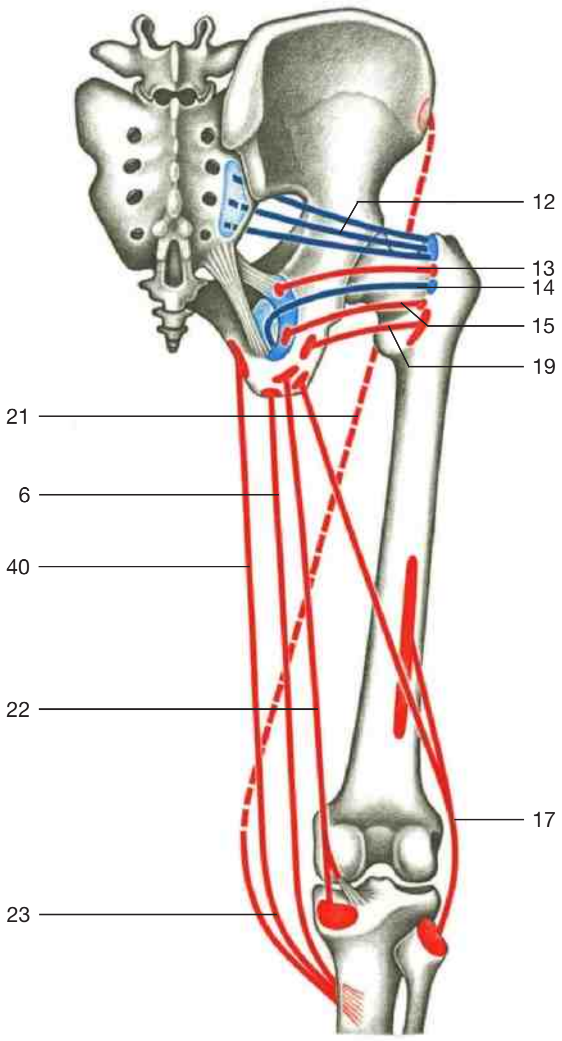
Gluteal muscles, deeper layer (posterior aspect).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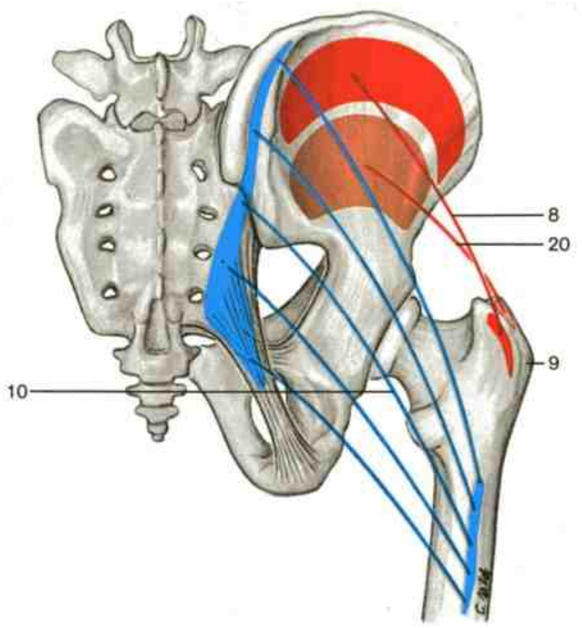
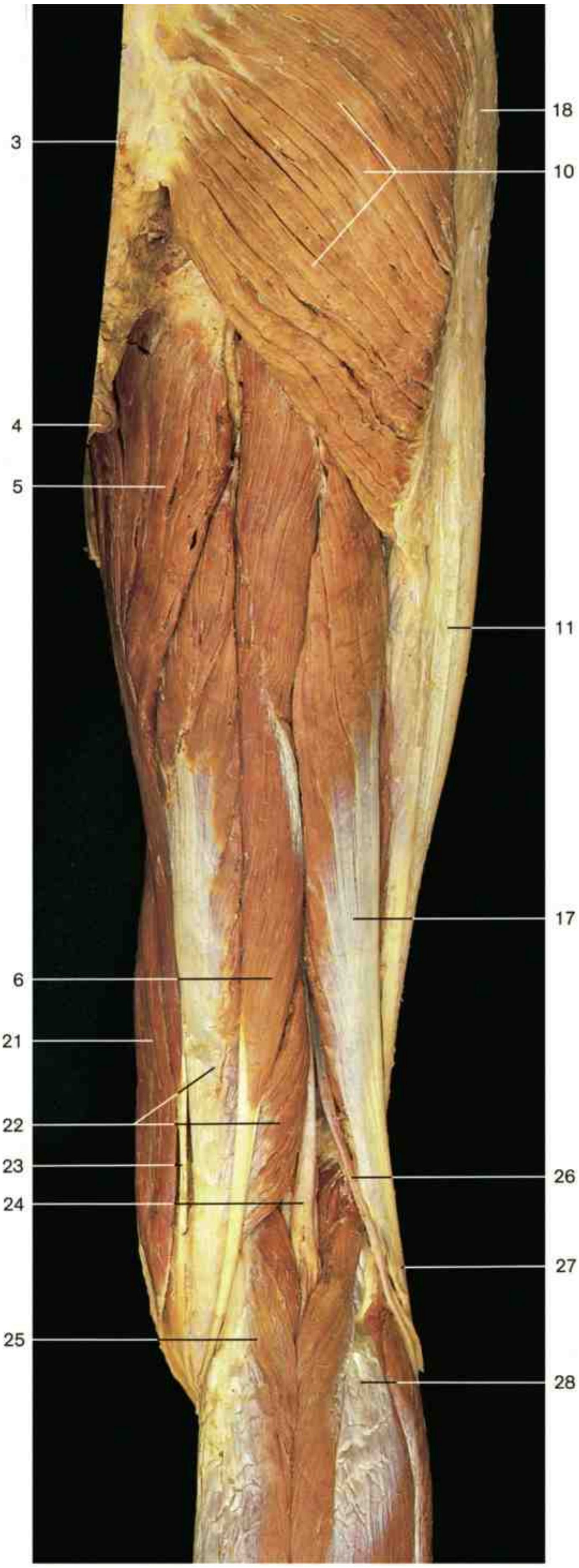


Course of gluteal muscles
(posterior aspect; schematic drawing).

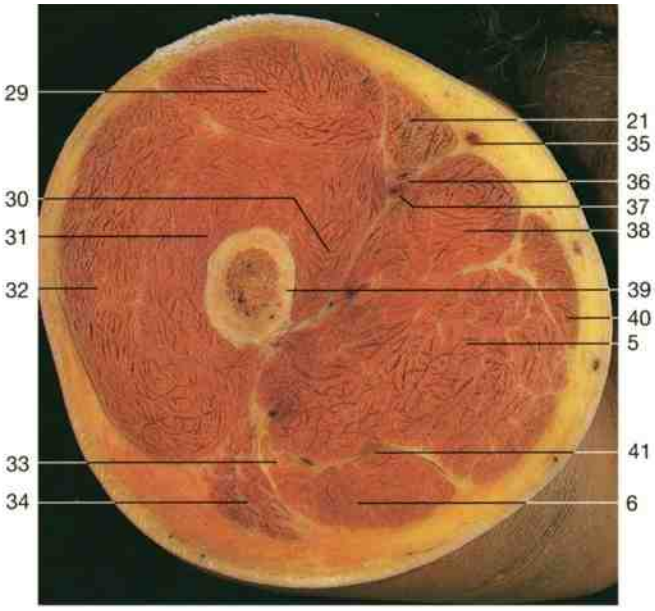
◁

Course of gluteal muscles (deeper layer) **and of ischiocrural muscles** (posterior aspect). Sartorius muscle is indicated by a dotted line (schematic drawing).

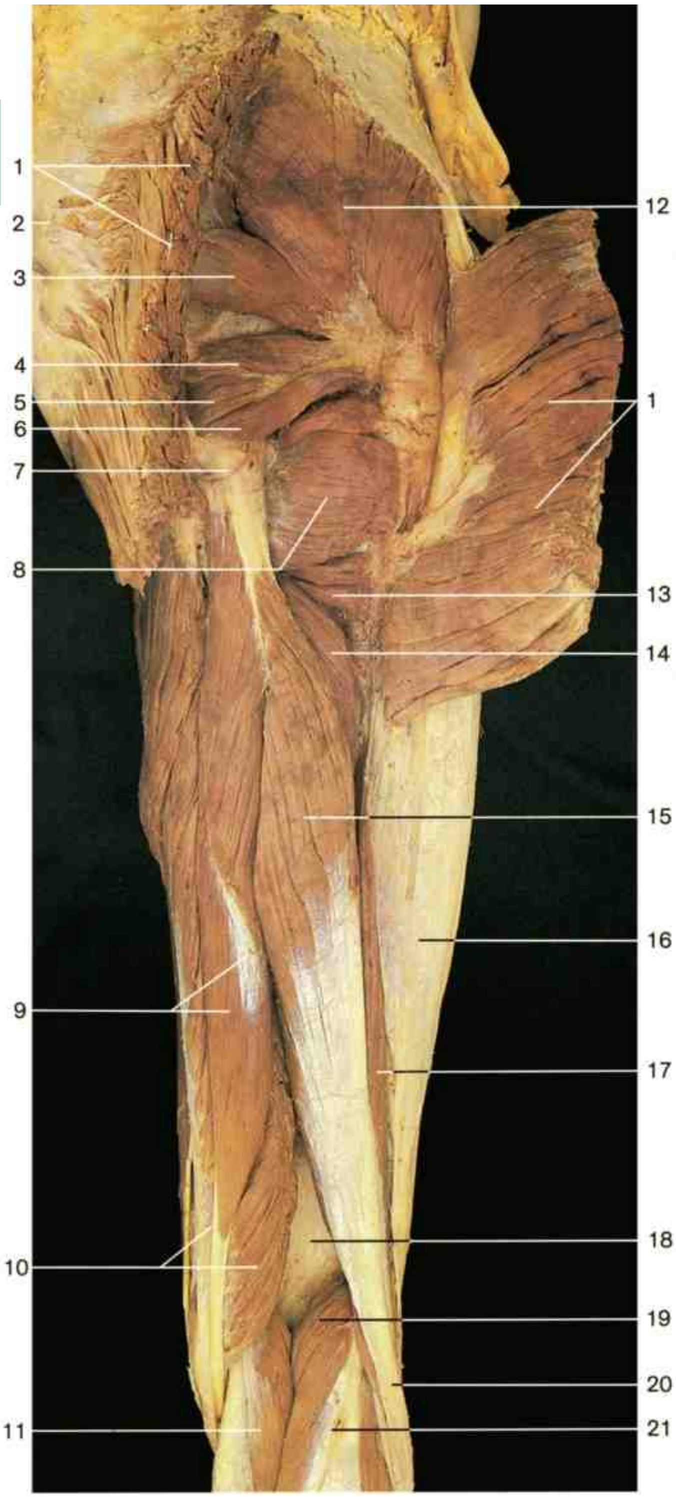


Flexors of the right thigh, superficial layer (posterior aspect).

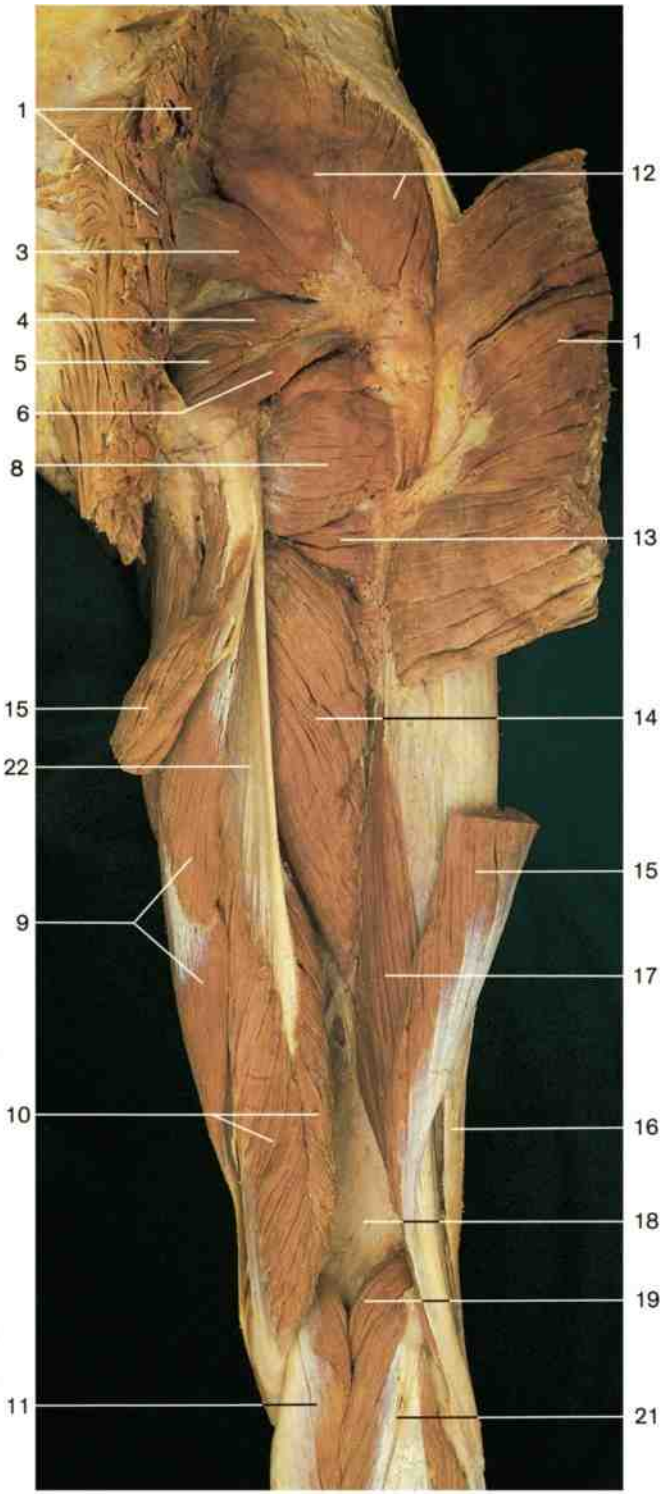
1 Thoracolumbar fascia
2 Spinous processes of lumbar vertebrae
3 Coccyx
4 Anus
5 Adductor magnus muscle
6 Semitendinosus muscle
7 Iliac crest
8 Gluteus medius muscle
9 Greater trochanter
10 Gluteus maximus muscle
11 Iliotibial tract
12 Piriformis muscle
13 Superior gemellus muscle
14 Obturator internus muscle
15 Inferior gemellus muscle
16 Ischial tuberosity
17 Biceps femoris muscle
18 Tensor fasciae latae muscle
19 Quadratus femoris muscle
20 Gluteus minimus muscle
21 Sartorius muscle
22 Semimembranosus muscle
23 Tendon of gracilis muscle
24 Tibial nerve
25 Medial head of gastrocnemius muscle
26 Common peroneal nerve
27 Tendon of biceps femoris muscle
28 Lateral head of gastrocnemius muscle
29 Rectus femoris muscle
30 Vastus medialis muscle
31 Vastus intermedius muscle
32 Vastus lateralis muscle
33 Sciatic nerve
34 Gluteus maximus muscle (insertion)
35 Great saphenous vein
36 Femoral artery
37 Femoral vein
38 Adductor longus muscle
39 Femur
40 Gracilis muscle
41 Septum between semitendinosus and semimembranosus muscles



Cross section of right thigh (inferior aspect). Anterior side on top.

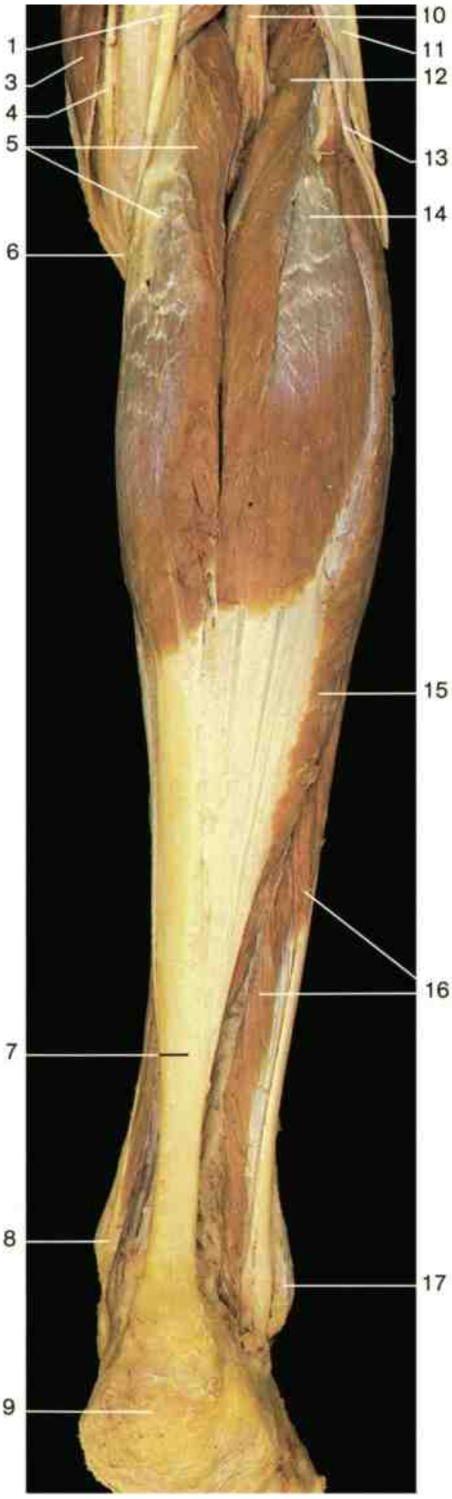


Dorsal muscles of right thigh (posterior aspect).
The gluteus maximus muscle has been cut and reflected.

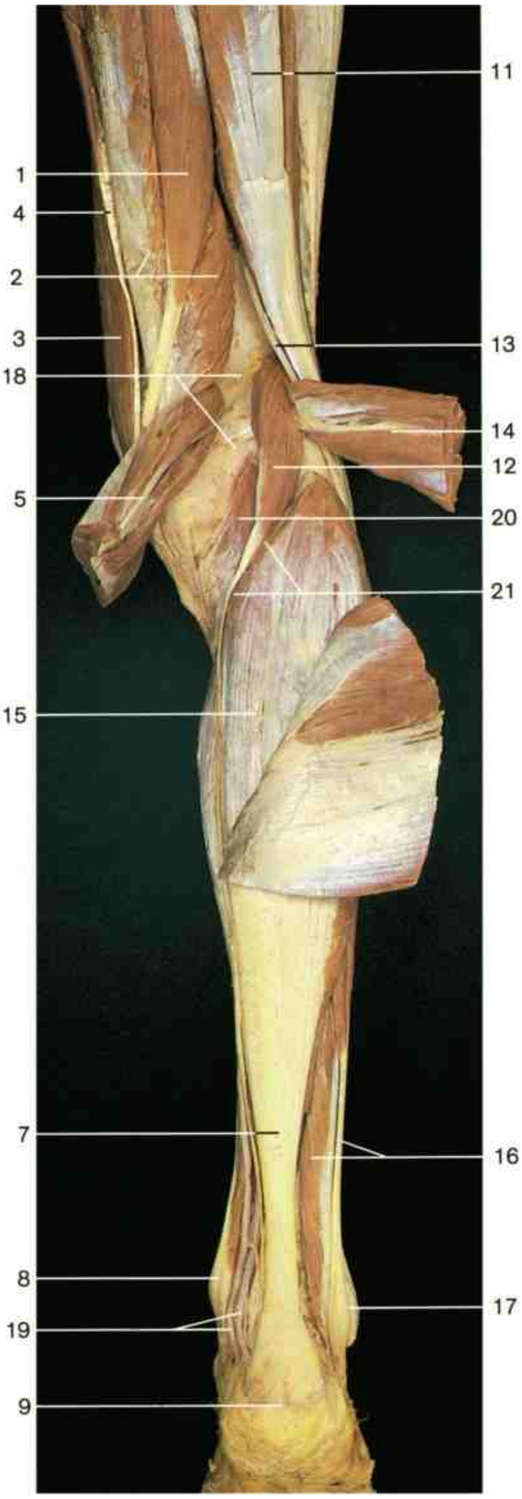


Dorsal muscles of right thigh (posterior aspect).
The gluteus maximus muscle and the long head of biceps femoris muscle have been divided and displaced.

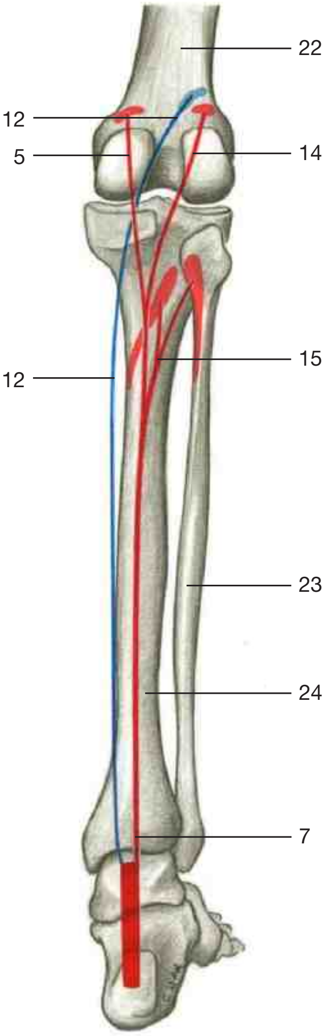
1 Gluteus maximus muscle (divided)
2 Position of coccyx
3 Piriformis muscle
4 Superior gemellus muscle
5 Obturator internus muscle
6 Inferior gemellus muscle
7 Ischial tuberosity
8 Quadratus femoris muscle
9 Semitendinosus muscle with intermediate tendon
10 Semimembranosus muscle
11 Medial head of gastrocnemius muscle
12 Gluteus medius muscle
13 Adductor minimus muscle
14 Adductor magnus muscle
15 Long head of biceps femoris muscle
16 Iliotibial tract
17 Short head of biceps femoris muscle
18 Popliteal surface of femur
19 Plantaris muscle
20 Tendon of biceps femoris muscle
21 Lateral head of gastrocnemius muscle
22 Membranous part of semimembranosus muscle



Flexor muscles of right leg (posterior aspect).

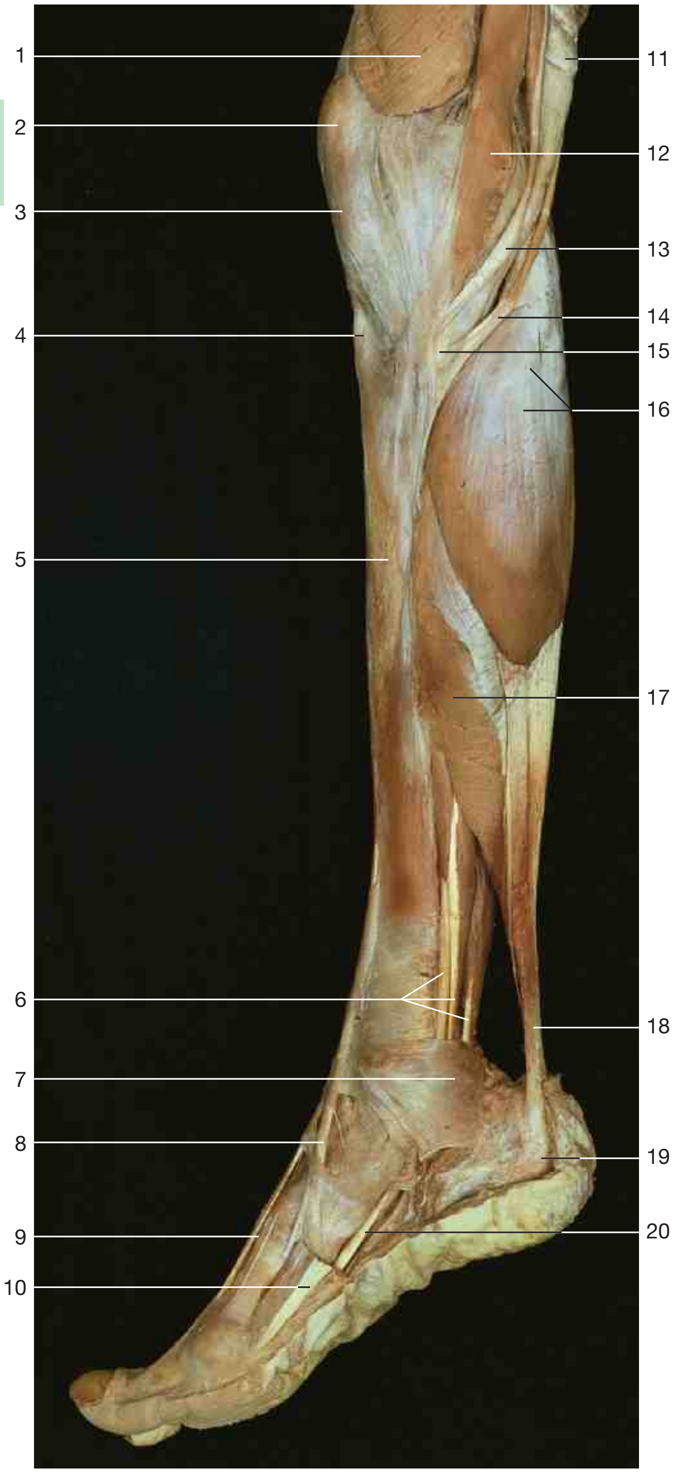


Flexor muscles of right leg (posterior aspect). Both heads of the gastrocnemius muscle have been cut and reflected.

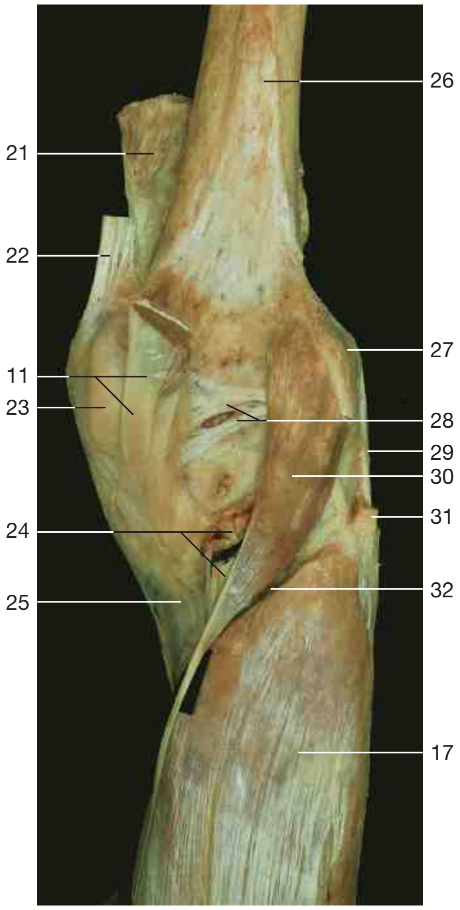


Flexor muscles of the leg (right side).

1 Semitendinosus muscle
2 Semimembranosus muscle
3 Sartorius muscle
4 Tendon of gracilis muscle
5 Medial head of gastrocnemius muscle
6 Common tendon of gracilis, sartorius, and semitendinosus muscles
7 Calcaneal or Achilles tendon
8 Medial malleolus
9 Calcaneal tuberosity
10 Tibial nerve
11 Biceps femoris muscle
12 Plantaris muscle
13 Common peroneal nerve
14 Lateral head of gastrocnemius muscle
15 Soleus muscle
16 Peroneus longus and brevis muscles
17 Lateral malleolus
18 Popliteal fossa
19 Tibial nerve and posterior tibial artery
20 Popliteus muscle
21 Tendinous arch of soleus muscle
22 Femur
23 Fibula
24 Tibia

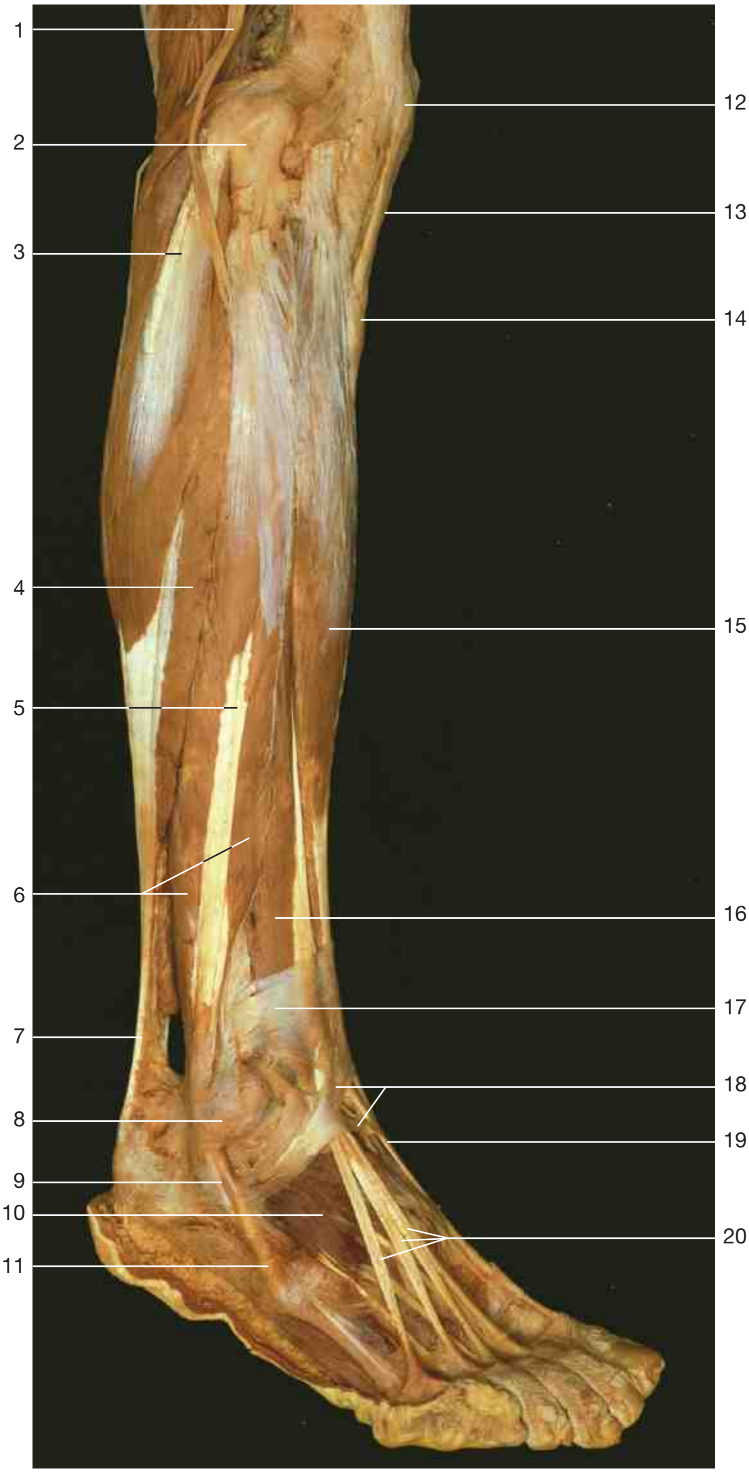


Muscles of right leg and foot (medial aspect).

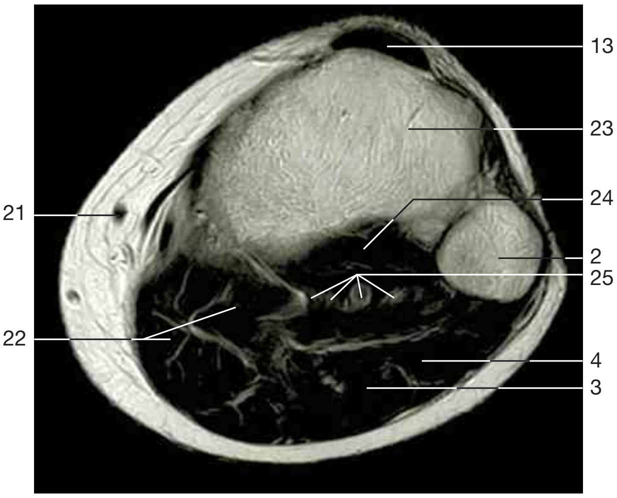


Popliteal region with plantaris and soleus muscles, right side (dorsal aspect). Notice the insertion of the tendon of semimembranosus muscle.

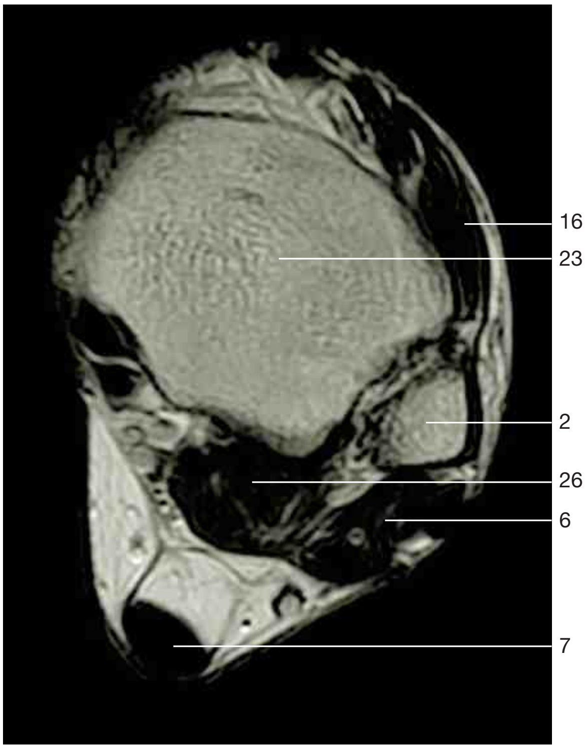
1 Vastus medialis muscle
2 Patella
3 Patellar ligament
4 Tibial tuberosity
5 Tibia
6 Tendons of deep flexor muscles (from anterior to posterior: 1. tibialis posterior; 2. flexor digitorum longus; 3. flexor hallucis longus muscles)
7 Flexor retinaculum
8 Tendon of tibialis anterior muscle
9 Tendon of extensor hallucis longus muscle
10 Abductor hallucis muscle
11 Semimembranosus muscle
12 Sartorius muscle
13 Tendon of gracilis muscle
14 Tendon of semitendinosus muscle
15 Common tendon of gracilis, semitendinosus, and sartorius muscles
16 Medial head of gastrocnemius muscle
17 Soleus muscle
18 Calcaneal or Achilles tendon
19 Calcaneus muscle
20 Tendon of flexor hallucis longus muscle
21 Quadriceps femoris muscle (divided)
22 Tendon of adductor magnus muscle (divided)
23 Medial condyle of femur
24 Popliteal artery and vein, tibial nerve
25 Tibia
26 Femur
27 Lateral epicondyle of femur
28 Oblique popliteal ligament
29 Lateral (fibular) collateral ligament
30 Plantaris muscle
31 Tendon of biceps femoris muscle (divided)
32 Tendinous arch of soleus muscle



Muscles of right leg and foot (lateral aspect).

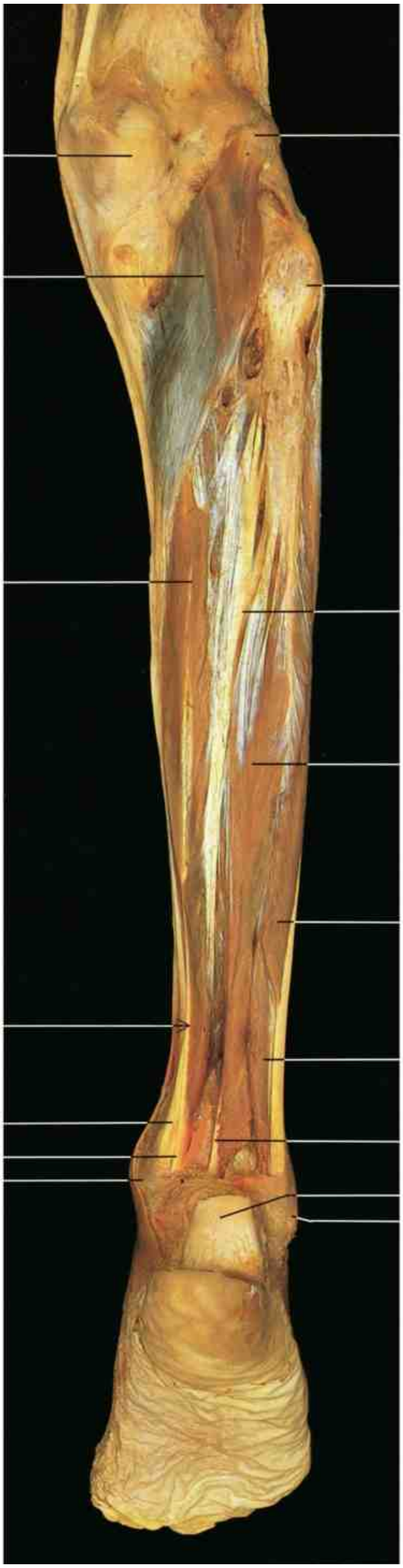


Axial section of the right leg distally of the knee joint (MRI scan; from Heuck et al., MRT-Atlas, 2009).



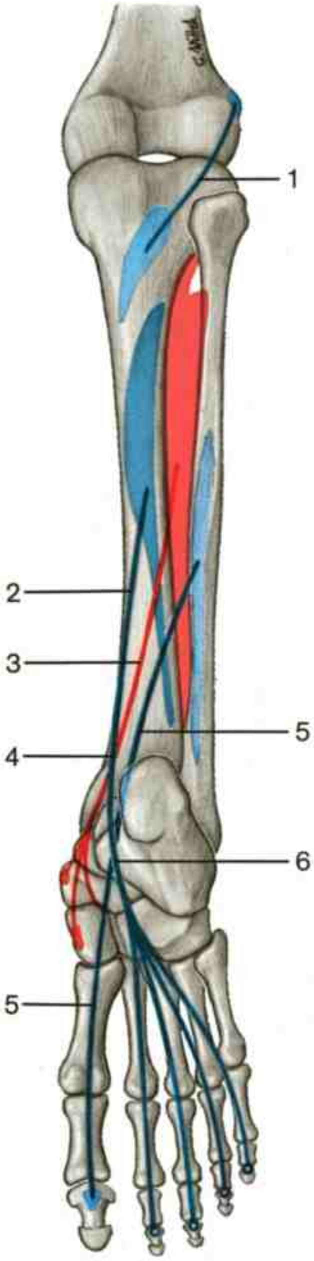
Axial section of the right leg cranially of the ankle joint (MRI scan; from Heuck et al., MRT-Atlas, 2009).

1 Common peroneal nerve
2 Head of fibula
3 Lateral head of gastrocnemius muscle
4 Soleus muscle
5 Peroneus longus muscle
6 Peroneus brevis muscle
7 Calcaneal or Achilles tendon
8 Lateral malleolus muscle
9 Tendon of peroneus longus muscle
10 Extensor digitorum brevis muscle
11 Tendon of peroneus brevis muscle
12 Patella
13 Patellar ligament
14 Tuberosity of tibia
15 Tibialis anterior muscle
16 Extensor digitorum longus muscle
17 Superior extensor retinaculum
18 Inferior extensor retinaculum
19 Tendon of extensor hallucis longus muscle
20 Tendons of extensor digitorum longus muscle
21 Great saphenous vein
22 Medial head of gastrocnemius muscle
23 Tibia
24 Popliteus muscle
25 Tibial nerve, popliteal artery, and veins
26 Flexor hallucis longus muscle



1 Medial condyle of femur
2 Popliteus muscle
3 Flexor digitorum longus muscle
4 Crossing of tendons in leg
5 Tendon of tibialis posterior muscle
6 Tendon of flexor digitorum longus muscle
7 Medial malleolus
8 Lateral condyle of femur
9 Head of fibula
10 Tibialis posterior muscle
11 Flexor hallucis longus muscle
12 Peroneus longus muscle
13 Peroneus brevis muscle
14 Tendon of flexor hallucis longus muscle
15 Calcaneal tendon (divided)
16 Lateral malleolus

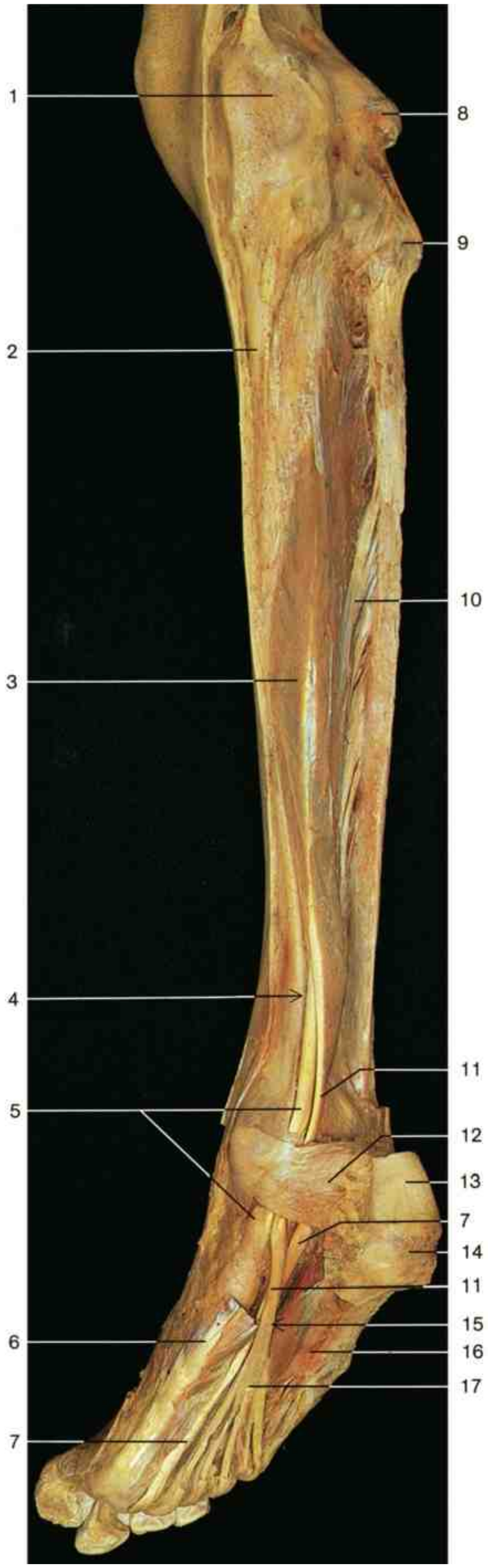
Deep flexor muscles of right leg and foot (posterior aspect).



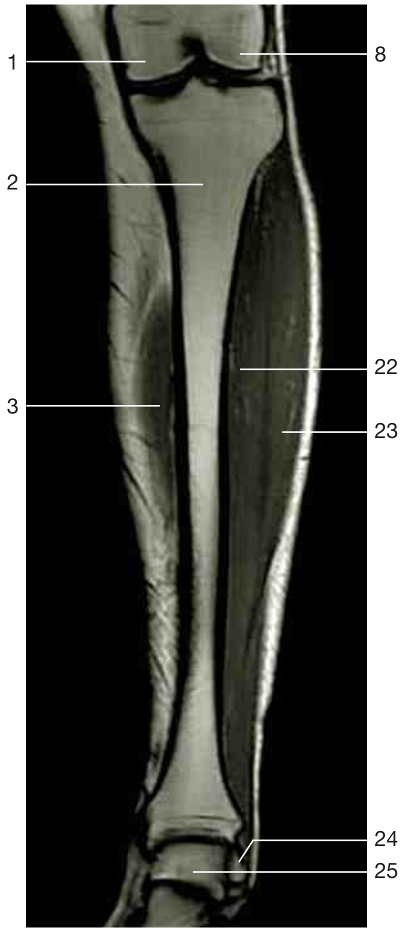
1 Popliteus muscle (blue)
2 Flexor digitorum longus muscle (blue)
3 Tibialis posterior muscle (red)
4 Crossing of tendons in leg
5 Flexor hallucis longus muscle (blue)
6 Crossing of tendons in sole

Course of deep flexor muscles of leg (schematic drawing).

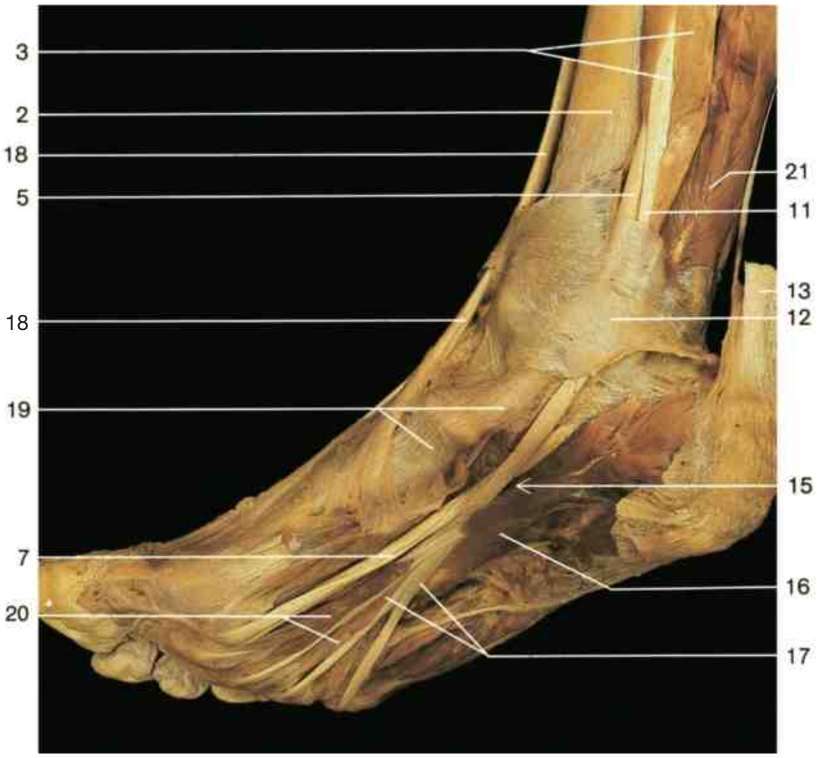
1 Medial condyle of femur
2 Tibia
3 Flexor digitorum longus muscle
4 Crossing of tendons in leg
5 Tendon of tibialis posterior muscle
6 Abductor hallucis muscle
7 Tendon of flexor hallucis longus muscle
8 Lateral condyle of femur
9 Head of fibula
10 Tibialis posterior muscle
11 Tendon of flexor digitorum longus muscle
12 Flexor retinaculum
13 Calcaneal tendon
14 Calcaneal tuberosity
15 Crossing of tendons in sole
16 Quadratus plantae muscle
17 Tendons of flexor digitorum longus muscle
18 Tendon of tibialis anterior muscle
19 Area of insertion of tibialis posterior muscle
20 Lumbrical muscles
21 Flexor hallucis longus muscle
22 Tibialis anterior muscle
23 Extensor hallucis longus muscle
24 Lateral malleolus of fibula
25 Trochlea of talus



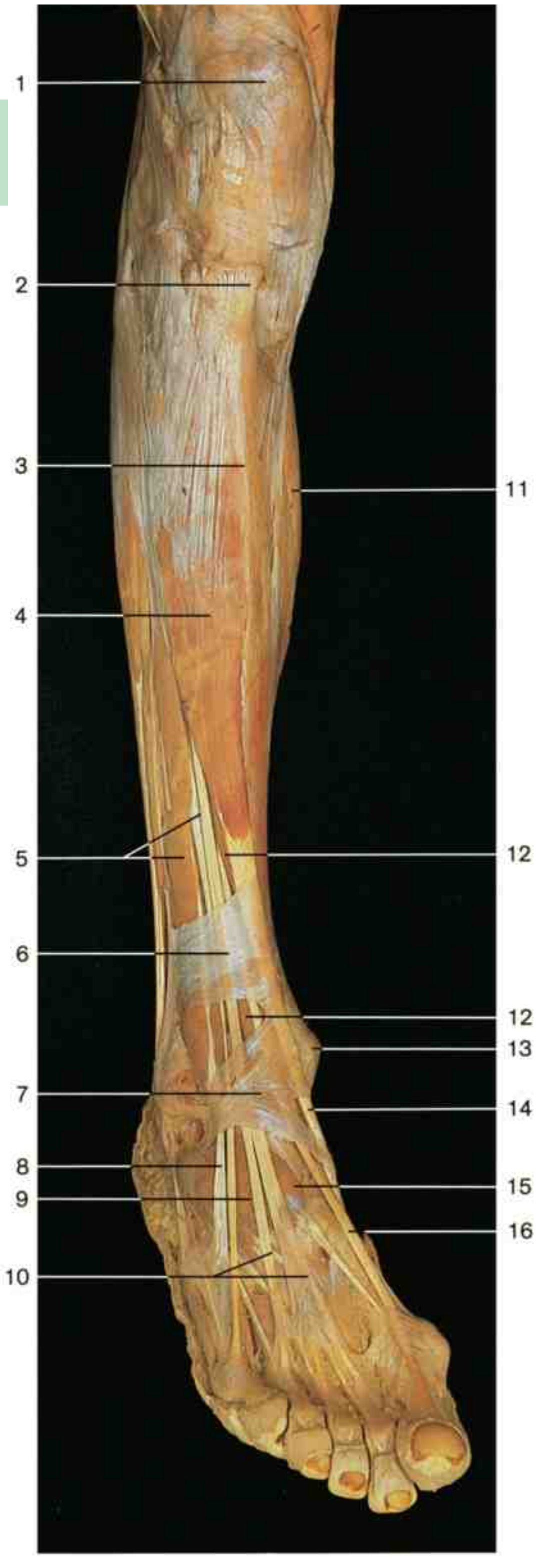
Deep flexor muscles of right leg and foot (posterior oblique medial aspect). Flexor digitorum brevis and flexor hallucis longus muscles have been removed.



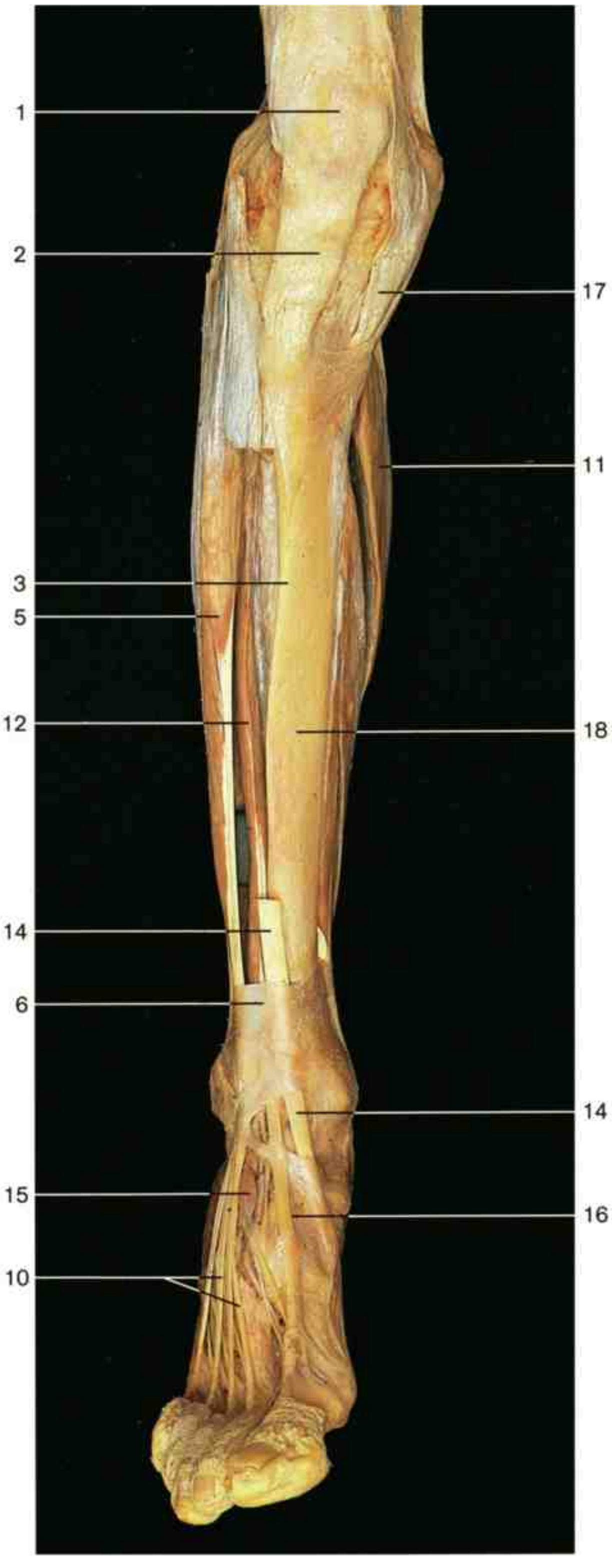
Coronal section of the leg (MRI scan; from Heuck et al., MRT-Atlas, 2009).



Sole of foot with tendons of long flexor muscles (oblique medial and inferior aspect).

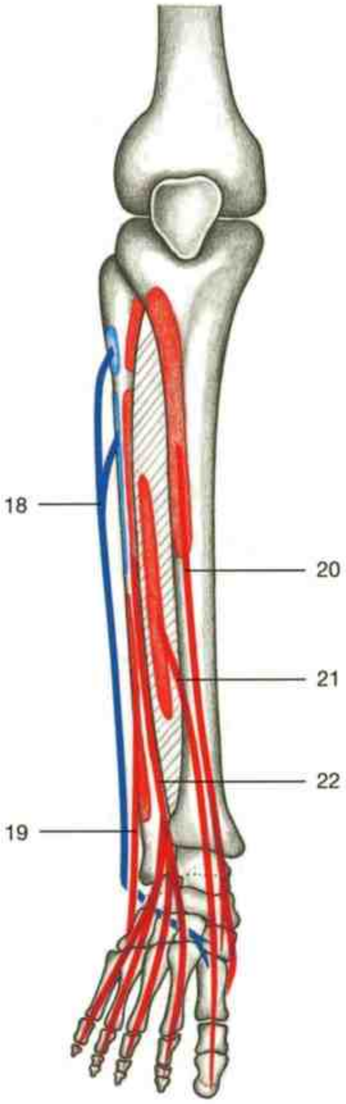


Extensor muscles of right leg and foot (oblique antero-lateral aspect).

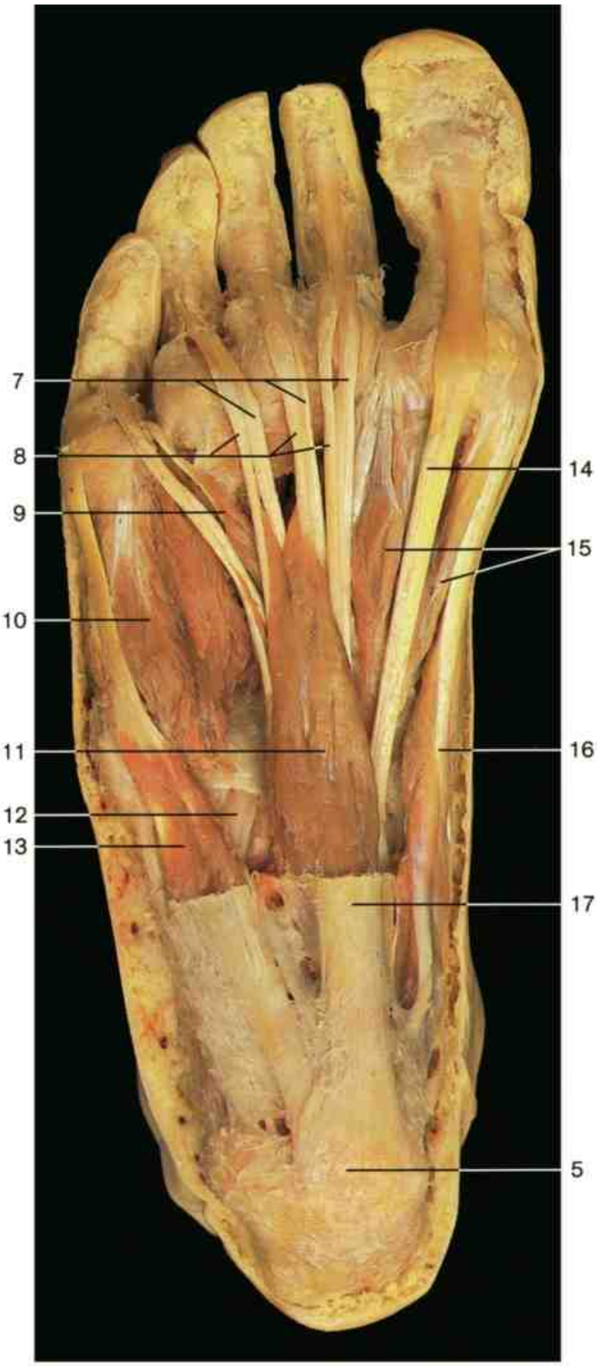


Extensor muscles of right leg and foot (anterior aspect). Part of the tibialis anterior muscle has been removed.

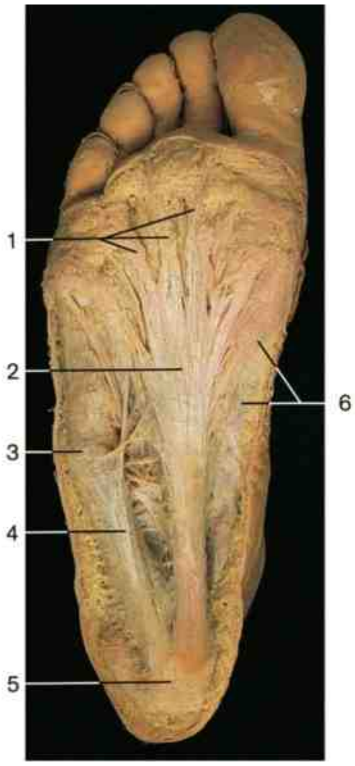
1 Patella
2 Patellar ligament
3 Anterior margin of tibia
4 Tibialis anterior muscle
5 Extensor digitorum longus muscle
6 Superior extensor retinaculum
7 Inferior extensor retinaculum
8 Tendon of peroneus tertius muscle
9 Extensor digitorum brevis muscle
10 Tendons of extensor digitorum longus muscle
11 Gastrocnemius muscle
12 Extensor hallucis longus muscle
13 Medial malleolus
14 Tendon of tibialis anterior muscle
15 Extensor hallucis brevis muscle
16 Tendon of extensor hallucis longus muscle
17 Common tendon of gracilis, semitendinosus, and sartorius muscles
18 Tibia



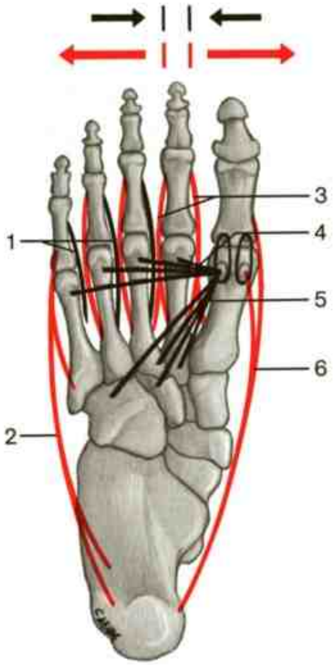
Extensor muscles of the leg (right side).



Muscles of sole of foot, first layer (from below). The plantar aponeurosis and the fasciae of the superficial muscles have been removed.



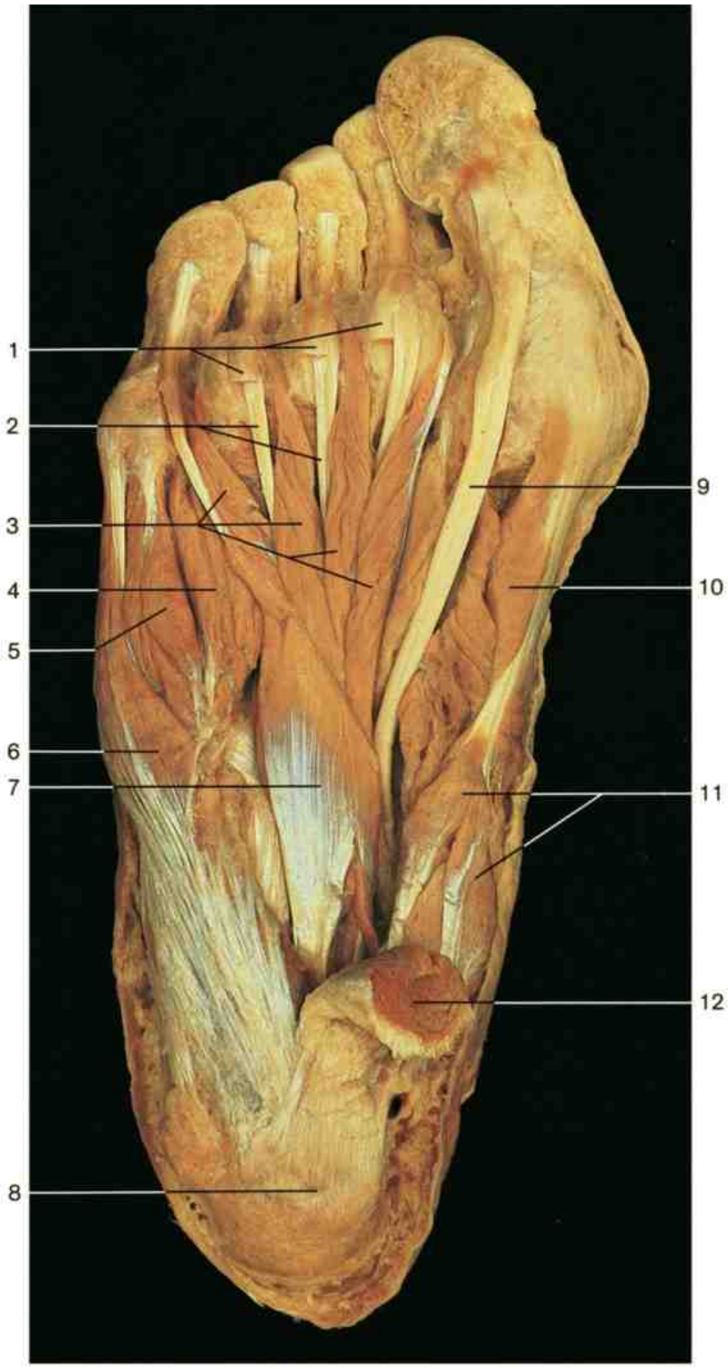
Sole of foot, plantar aponeurosis (from below).



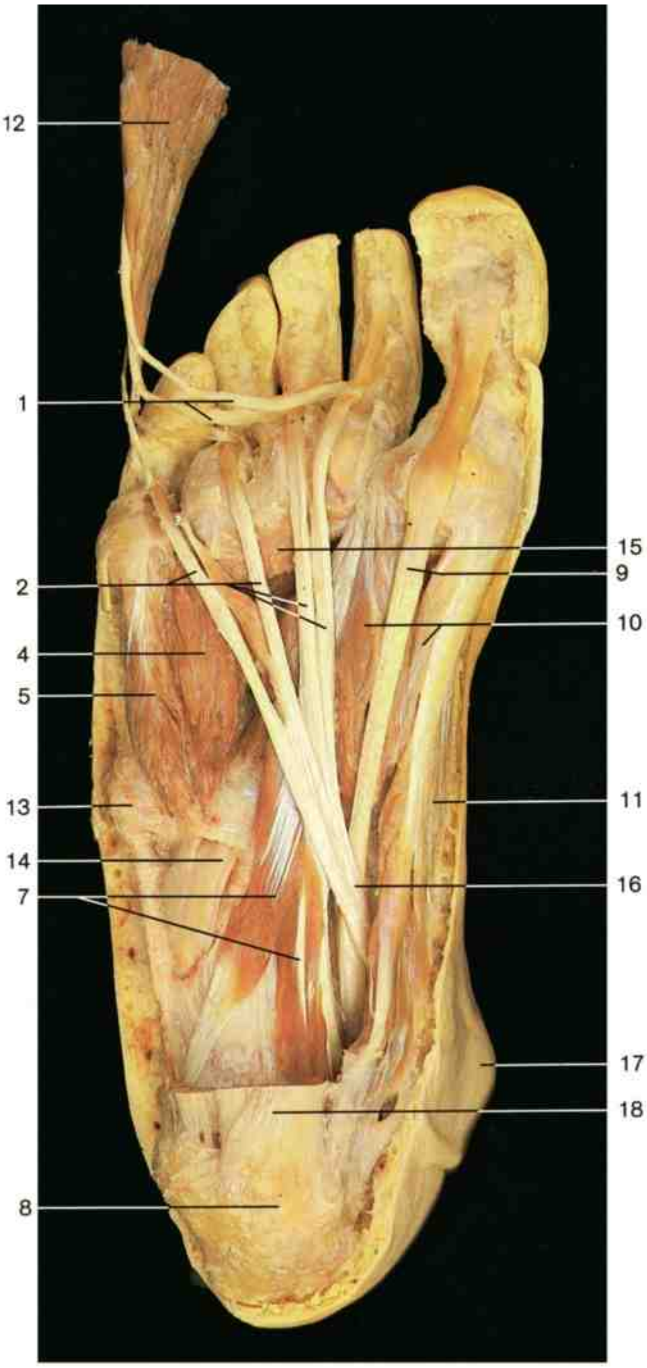
Course of abductor and adductor muscles of foot (schematic drawing).
Red arrows = abduction.
Black arrows = adduction.

1 Longitudinal bands of plantar aponeurosis
2 Plantar aponeurosis
3 Position of tuberosity of fifth metatarsal bone
4 Muscles of fifth toe with fascia
5 Calcaneal tuberosity
6 Muscles of great toe with fascia
7 Tendons of flexor digitorum longus muscle
8 Tendons of flexor digitorum brevis muscle
9 Lumbrical muscle
10 Flexor digiti minimi brevis muscle
11 Flexor digitorum brevis muscle
12 Tendon of peroneus longus muscle
13 Abductor digiti minimi muscle
14 Tendon of flexor hallucis longus muscle
15 Flexor hallucis brevis muscle
16 Abductor hallucis muscle
17 Plantar aponeurosis (cut)
18 Peroneus longus muscle
19 Peroneus brevis muscle
20 Tibialis anterior muscle
21 Extensor hallucis longus muscle
22 Extensor digitorum longus muscle

1 Plantar interossei muscles (black)
2 Abductor digiti minimi muscle (red)
3 Dorsal interosseous muscles (red)
4 Transverse head of adductor muscle (black)
5 Oblique head of adductor muscle (black)
6 Abductor hallucis muscle (red)

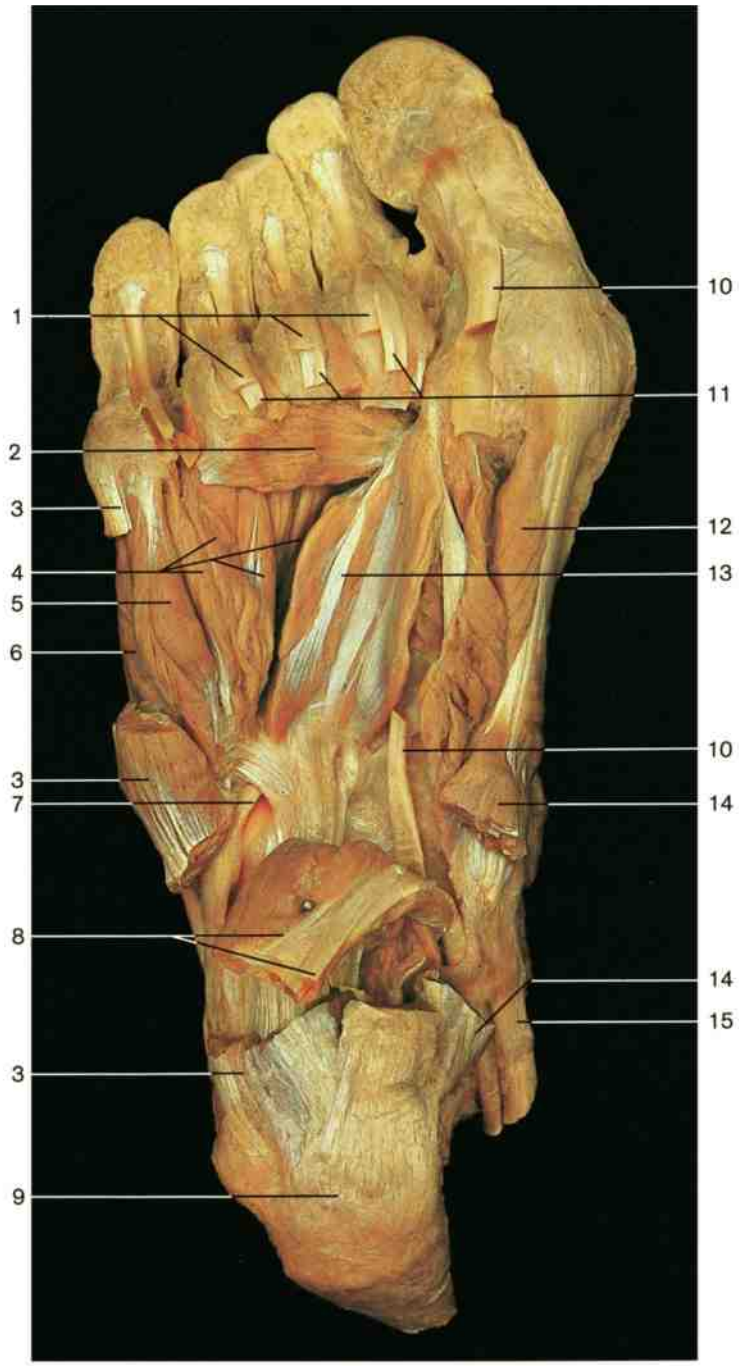


Muscles of sole of foot, second layer (from below). The flexor digitorum brevis muscle has been divided.

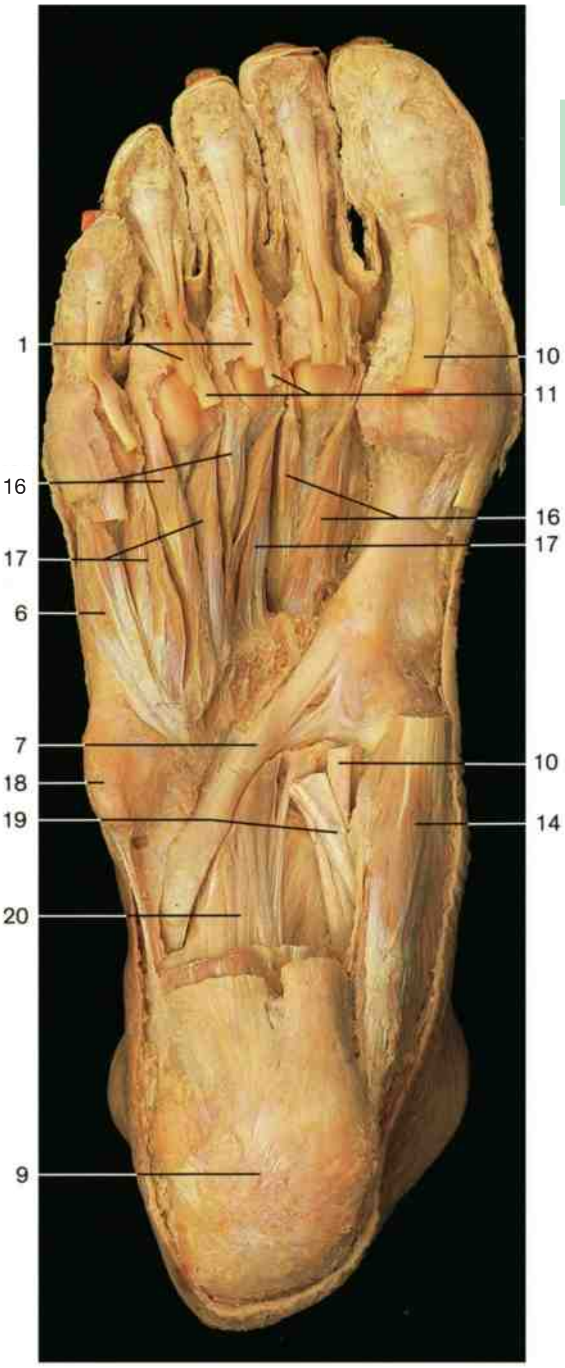


Muscles of sole of foot, second layer (from below). The tendons of the flexor muscles and the crossing of tendons are displayed. The flexor digitorum brevis muscle has been divided and reflected.

1 Tendons of flexor digitorum brevis muscle
2 Tendons of flexor digitorum longus muscle
3 Lumbrical muscles
4 Interossei muscles
5 Flexor digiti minimi brevis muscle
6 Abductor digiti minimi muscle
7 Quadratus plantae muscle
8 Calcaneal tuberosity
9 Tendon of flexor hallucis longus muscle
10 Flexor hallucis brevis muscle
11 Abductor hallucis muscle
12 Flexor digitorum brevis muscle (divided)
13 Tuberosity of fifth metatarsal bone
14 Tendon of peroneus longus muscle
15 Transverse head of adductor hallucis muscle
16 Crossing of tendons in sole of foot
17 Medial malleolus
18 Plantar aponeurosis (divided)

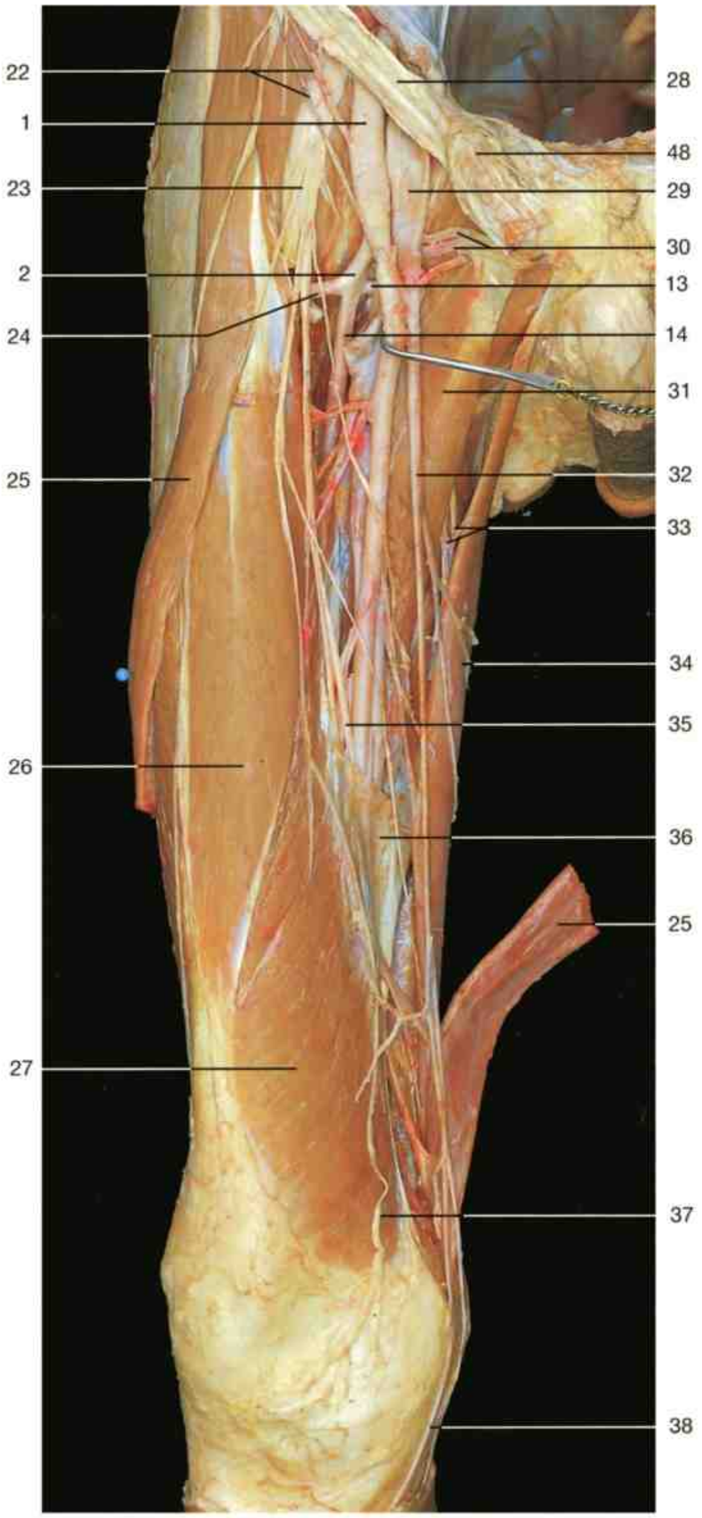


Muscles of sole of foot, third layer (from below). The flexor digitorum brevis muscle has been removed, and the quadratus plantae, abductor hallucis, and digiti minimi muscles have been divided.



Muscles of sole of foot, fourth layer (from below). The interosseous muscles and the canal for the tendon of peroneus longus muscle are shown.

1 Tendons of flexor digitorum brevis muscle
2 Transverse head of adductor hallucis muscle
3 Abductor digiti minimi muscle
4 Interossei muscles
5 Flexor digiti minimi brevis muscle
6 Opponens digiti minimi muscle
7 Tendon of peroneus longus muscle
8 Quadratus plantae muscle with tendon of flexor digitorum longus muscle
9 Calcaneal tuberosity
10 Tendons of flexor hallucis longus muscle (divided)
11 Tendon of flexor digitorum longus muscle
12 Flexor hallucis brevis muscle
13 Oblique head of adductor hallucis muscle
14 Abductor hallucis muscle (cut)
15 Tendon of tibialis posterior muscle
16 Dorsal interossei muscles
17 Plantar interossei muscles
18 Tuberosity of fifth metatarsal bone
19 Tendon of flexor digitorum longus muscle (crossing of plantar tendons)
20 Long plantar ligament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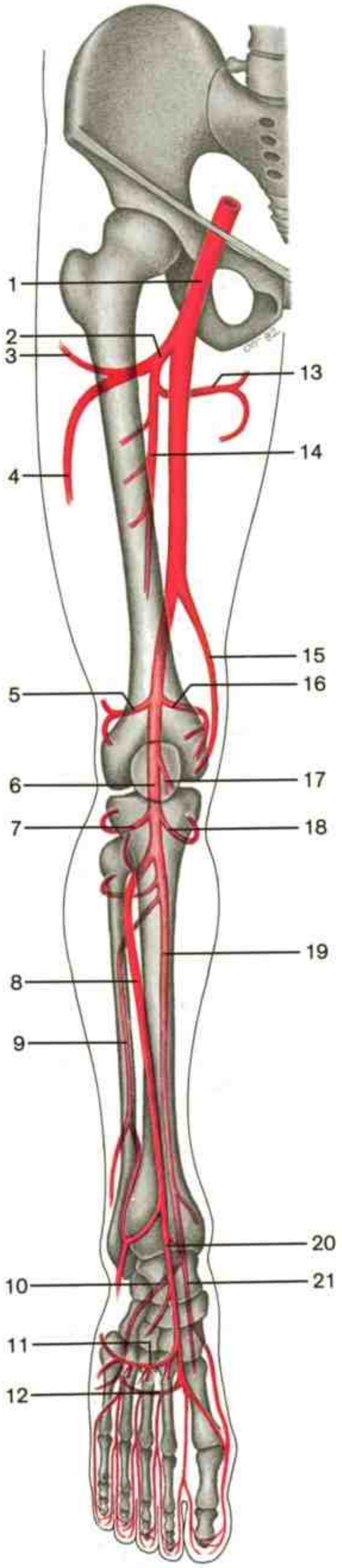
Main arteries and nerves of right thigh (anterior aspect). Sartorius muscle has been divided and reflected. The femoral vein has been partly removed to show the deep femoral artery. Notice: the vessels enter the adductor canal to reach the popliteal fossa.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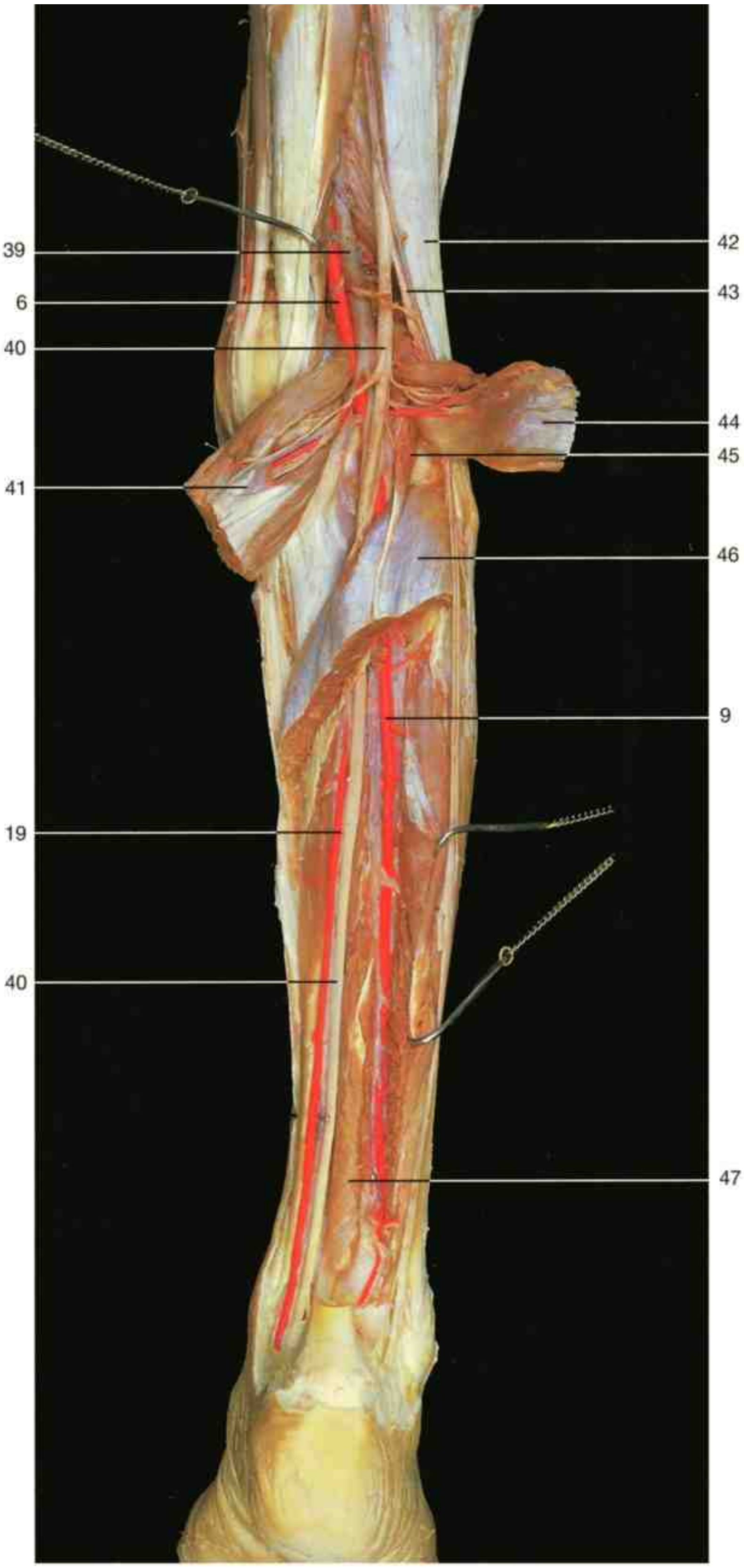
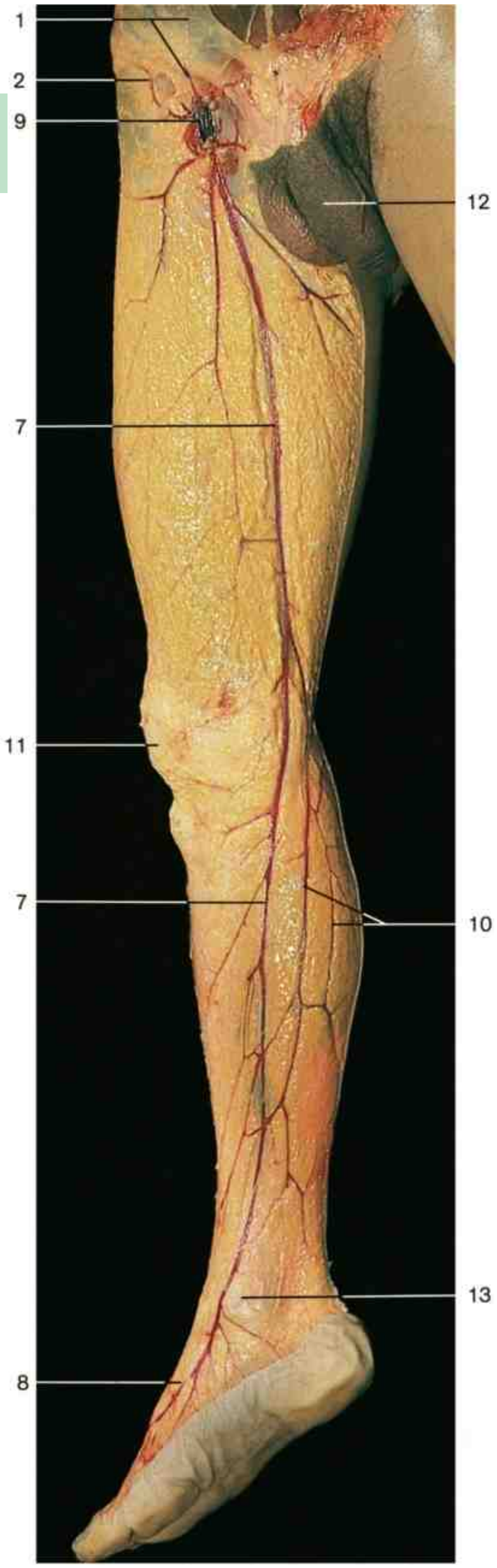
Main arteries of lower limb, right side (anterior aspect, schematic drawing).

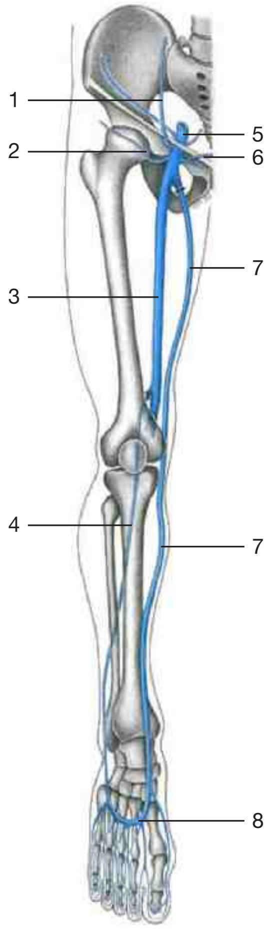


Arteries of the right leg (posterior aspect).

1 Femoral artery
2 Profunda femoris artery
3 Ascending branch of lateral circumflex femoral artery
4 Descending branch of lateral circumflex femoral artery
5 Lateral superior genicular artery
6 Popliteal artery
7 Lateral inferior genicular artery
8 Anterior tibial artery
9 Peroneal artery
10 Lateral plantar artery
11 Arcuate artery with dorsal metatarsal arteries
12 Plantar arch with plantar metatarsal arteries
13 Medial circumflex femoral artery
14 Profunda femoris artery with perforating arteries
15 Descending genicular artery
16 Medial superior genicular artery
17 Middle genicular artery
18 Medial inferior genicular artery
19 Posterior tibial artery
20 Dorsalis pedis artery
21 Medial plantar artery
22 Superficial and deep circumflex iliac arteries
23 Femoral nerve
24 Lateral circumflex femoral artery
25 Sartorius muscle (cut and reflected)
26 Rectus femoris muscle
27 Vastus medialis muscle
28 Inguinal ligament
29 Femoral vein (cut)
30 External pudendal artery and vein
31 Adductor longus muscle
32 Great saphenous vein
33 Obturator artery and nerve
34 Gracilis muscle
35 Saphenous nerve
36 Tendinous wall of adductor canal
37 Anterior cutaneous branch of femoral nerve
38 Infrapatellar branch of saphenous nerve
39 Popliteal vein
40 Tibial nerve
41 Medial head of gastrocnemius muscle
42 Biceps femoris muscle
43 Common peroneal nerve
44 Lateral head of gastrocnemius muscle
45 Plantaris muscle
46 Soleus muscle
47 Flexor hallucis longus muscle
48 Spermatic cord

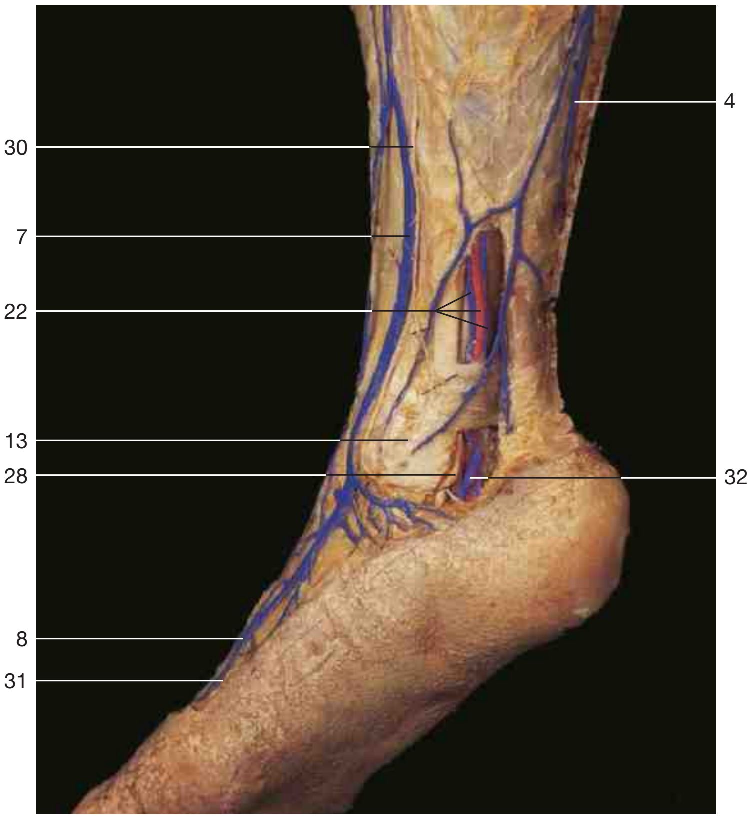


Superficial veins of lower limb, right side (medio-anterior aspect). The veins have been injected with red solution.

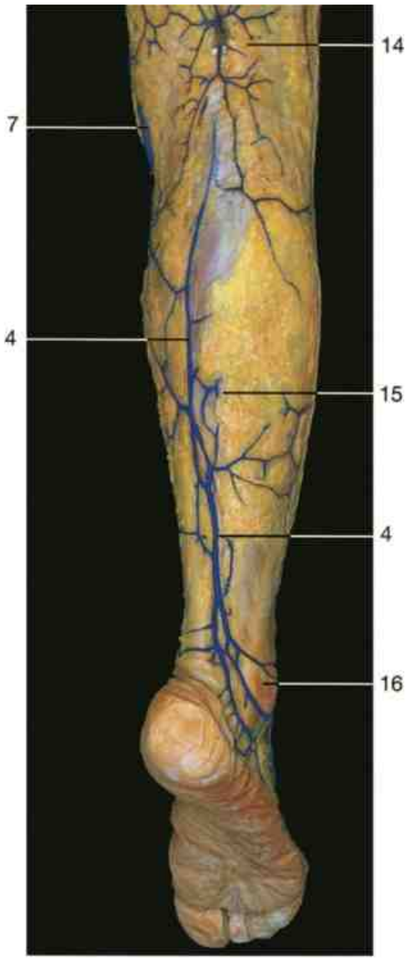


Main veins of lower limb, right side (anterior aspect, schematic drawing).

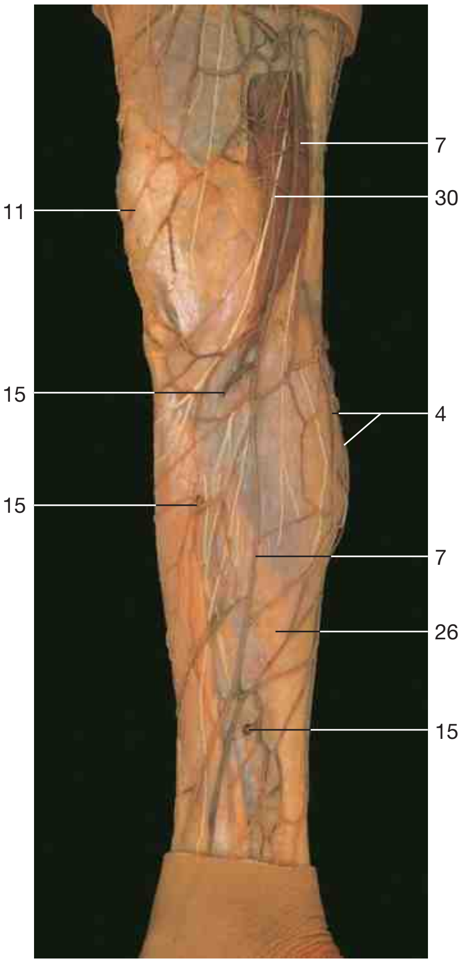
1	Superficial epigastric vein
2	Superficial circumflex iliac vein
3	Femoral vein
4	Small saphenous vein
5	External iliac vein
6	External pudendal vein
7	Great saphenous vein
8	Dorsal venous arch
9	Saphenous opening with femoral vein
10	Venous anastomoses of small saphenous vein with great saphenous vein
11	Patella
12	Penis
13	Medial malleolus
14	Popliteal fossa
15	Perforating veins
16	Lateral malleolus
17	Dorsal digital veins of foot
18	Dorsal venous arch of foot
19	Dorsal metatarsal veins
20	Anterior tibial artery and veins
21	Tibia
22	Posterior tibial artery and veins
23	Fibula
24	Peroneal artery and vein
25	Deep layer of crural fascia
26	Superficial layer of crural fascia
27	Perforating veins I–III (of Cockett)
28	Tibial nerve
29	Arcuate vein
30	Saphenous nerve
31	Medial dorsal cutaneous nerve (branch of superficial peroneal nerve)
32	Posterior tibial vein



Medial malleolar region. Dissection of tibial nerve, posterior tibial vessels, and great saphenous vein (veins injected with blue resin). ▷



Superficial veins of leg (posterior aspect; veins injected with blue resin).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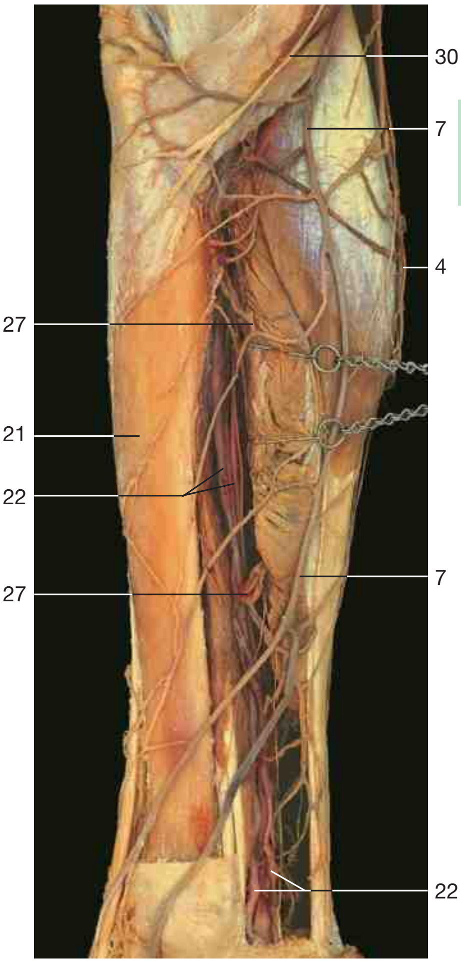
Superficial veins of leg. The perforating veins of Cockett have been dissected (left side, medial aspect).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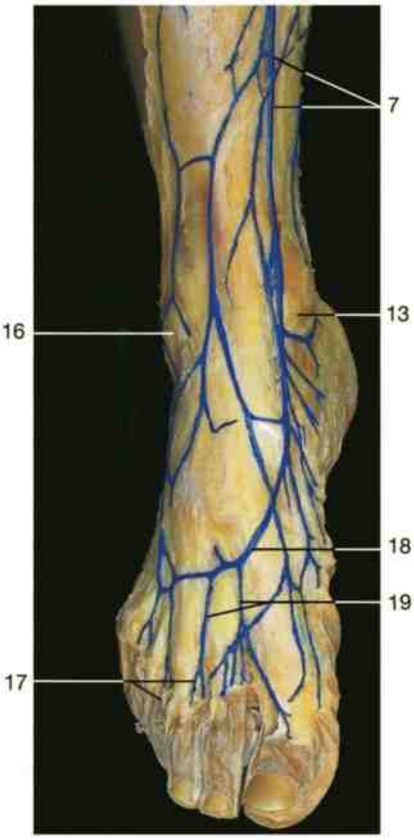
Veins of leg. The anastomoses between superficial and deeper veins are dissected (left side, medial aspect).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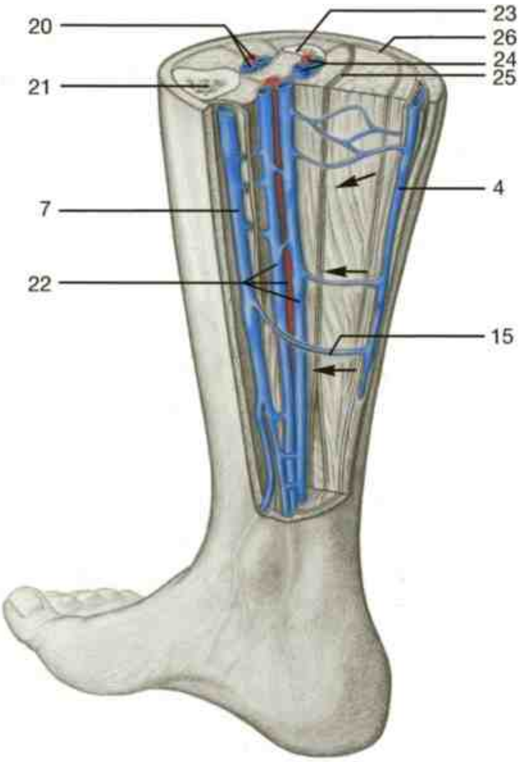
Superficial veins on dorsum of foot (veins injected with blue resin).

Anastomoses between superficial and deep veins of the leg (schematic drawing, after Aigner). ▷
Arrows: directions of blood flow.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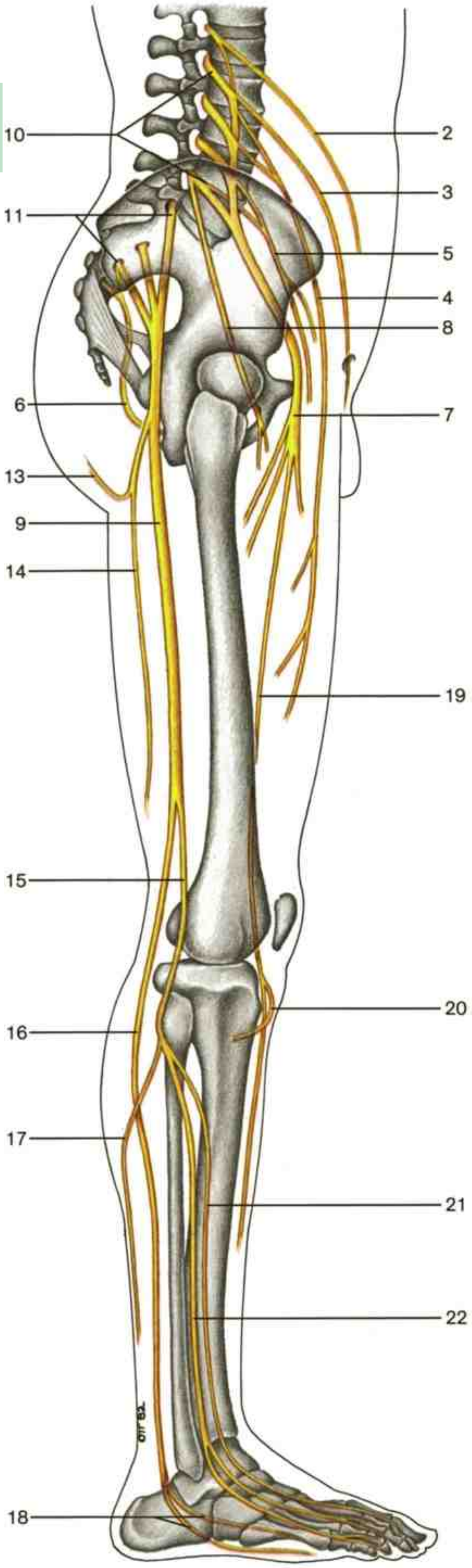
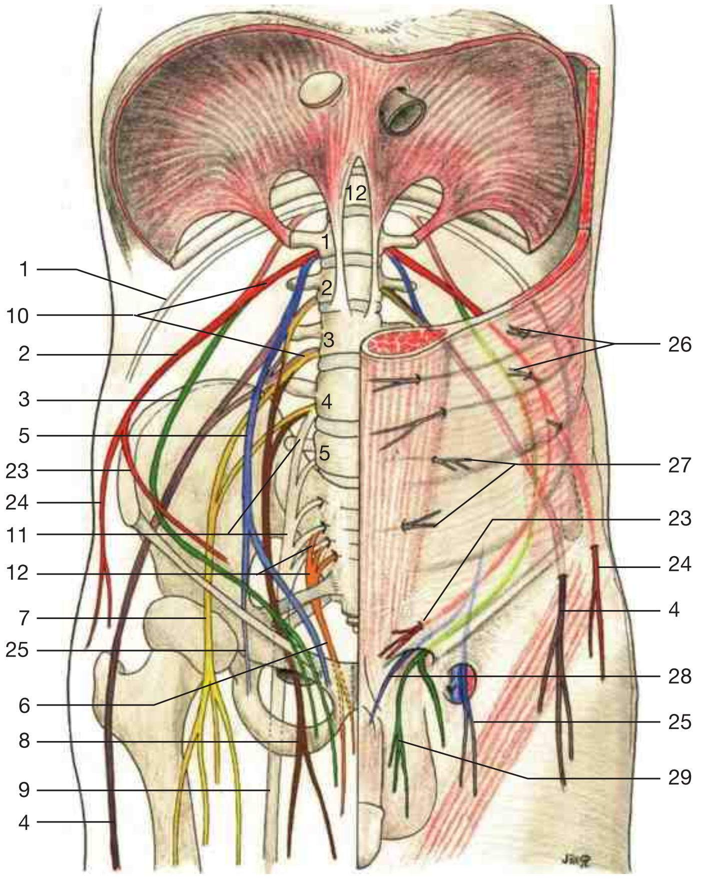
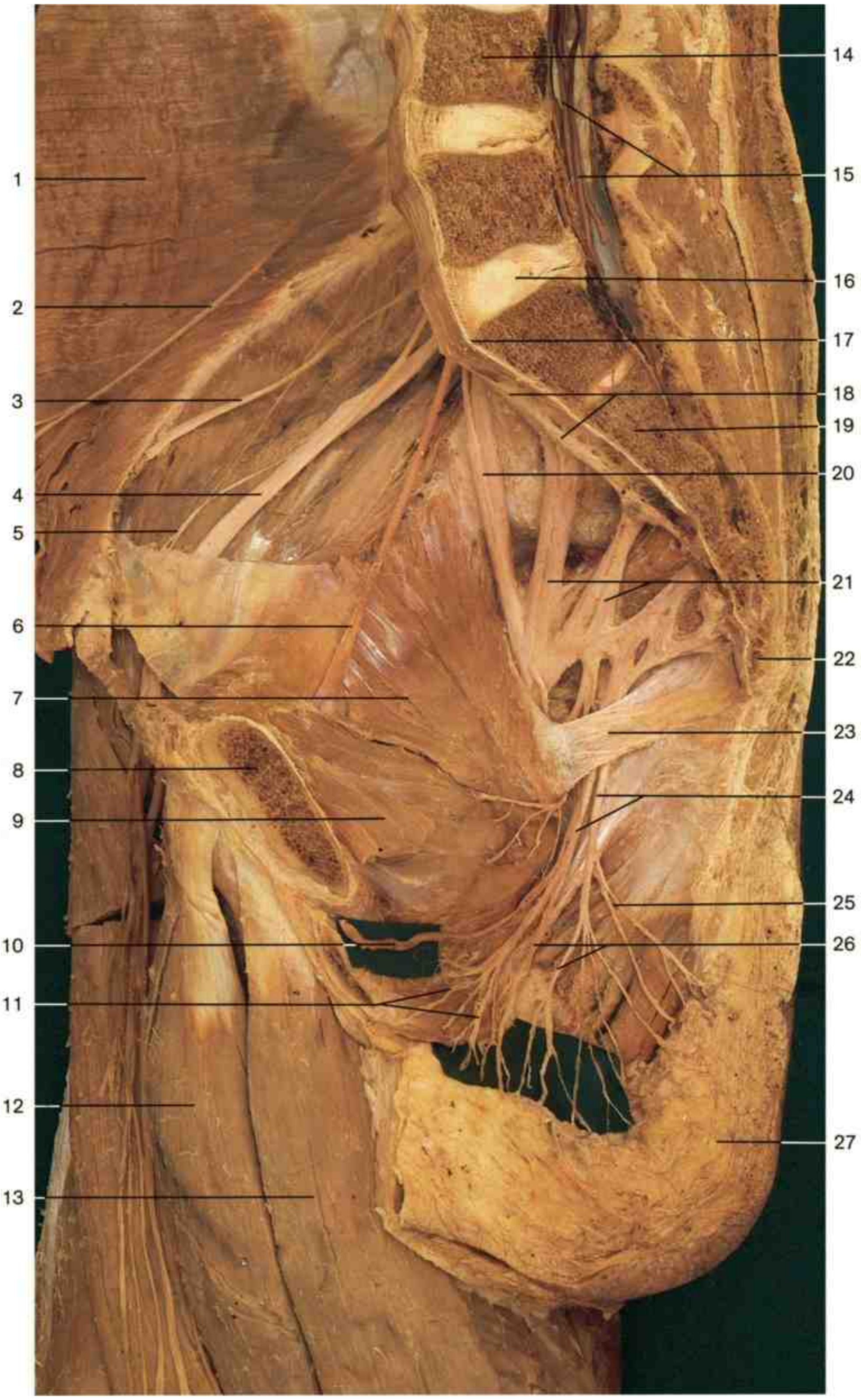
1 Subcostal nerve
2 Iliohypogastric nerve
3 Ilio-inguinal nerve
4 Lateral femoral cutaneous nerve
5 Genitofemoral nerve
6 Pudendal nerve
7 Femoral nerve
8 Obturator nerve
9 Sciatic nerve
10 Lumbar plexus (L_1–L_4) } lumbosacral plexus
11 Sacral plexus (L_4–S_4) } lumbosacral plexus
12 "Pudendal" plexus (S_2–S_4) } lumbosacral plexus
13 Inferior cluneal nerves
14 Posterior femoral cutaneous nerve
15 Common peroneal nerve
16 Tibial nerve
17 Lateral sural cutaneous nerve
18 Medial and lateral plantar nerves
19 Saphenous nerve
20 Infrapatellar branch of saphenous nerve
21 Deep peroneal nerve
22 Superficial peroneal nerve
23 Anterior cutaneous branch of iliohypogastric nerve
24 Lateral cutaneous branch of iliohypogastric nerve
25 Femoral branch of genitofemoral nerve
26 Lateral cutaneous branches of intercostal nerve
27 Anterior cutaneous branches of intercostal nerve
28 Genital branch of genitofemoral nerve
29 Anterior scrotal nerve



Nerves of lower limb, right side (lateral aspect). (Schematic drawing.)

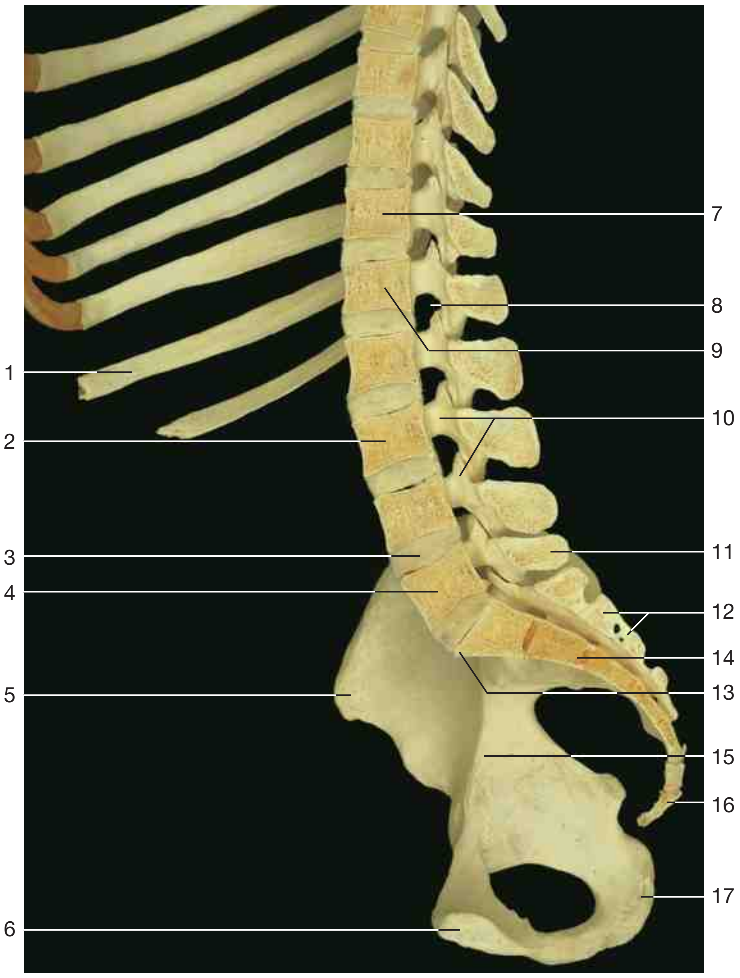


Main branches of lumbosacral plexus (ventral aspect). (Schematic drawing.)



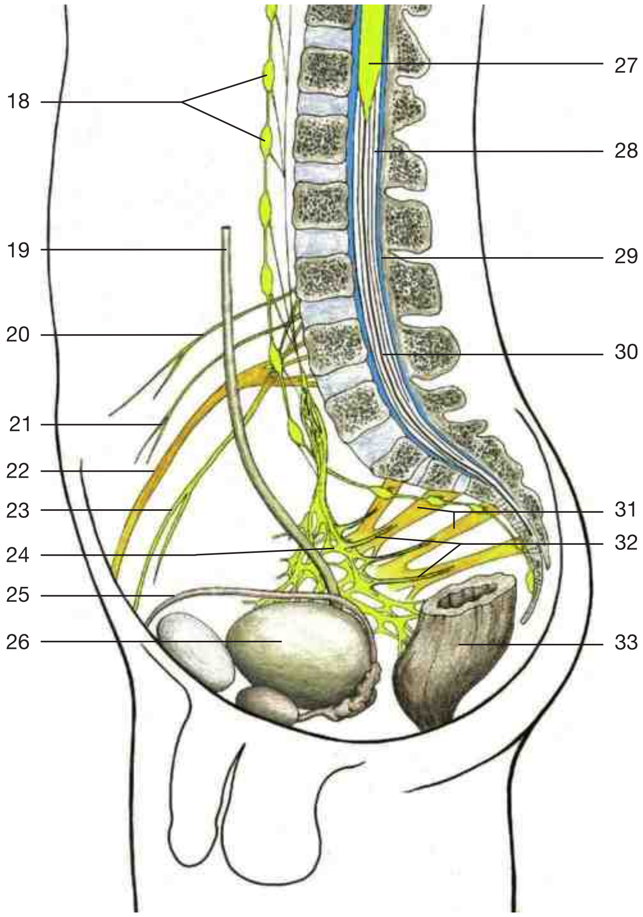
1	Transversus abdominis muscle
2	Iliohypogastric nerve
3	Ilio-inguinal nerve
4	Femoral nerve
5	Lateral femoral cutaneous nerve
6	Obturator nerve
7	Obturator internus muscle
8	Pubic bone (cut edge)
9	Levator ani muscle (remnant)
10	Dorsal nerve of penis
11	Posterior scrotal nerves
12	Adductor longus muscle
13	Gracilis muscle
14	Body of fourth lumbar vertebra
15	Cauda equina
16	Intervertebral disc
17	Sacral promontory
18	Sympathetic trunk
19	Sacrum
20	Lumbosacral trunk
21	Sacral plexus
22	Coccyx
23	Sacrospinous ligament
24	Pudendal nerve
25	Inferior rectal nerves
26	Perineal nerves
27	Subcutaneous fat tissue of gluteal region

Lumbosacral plexus in situ, right side (medial aspect).
Pelvic organs with peritoneum and part of the levator ani muscle have been removed.

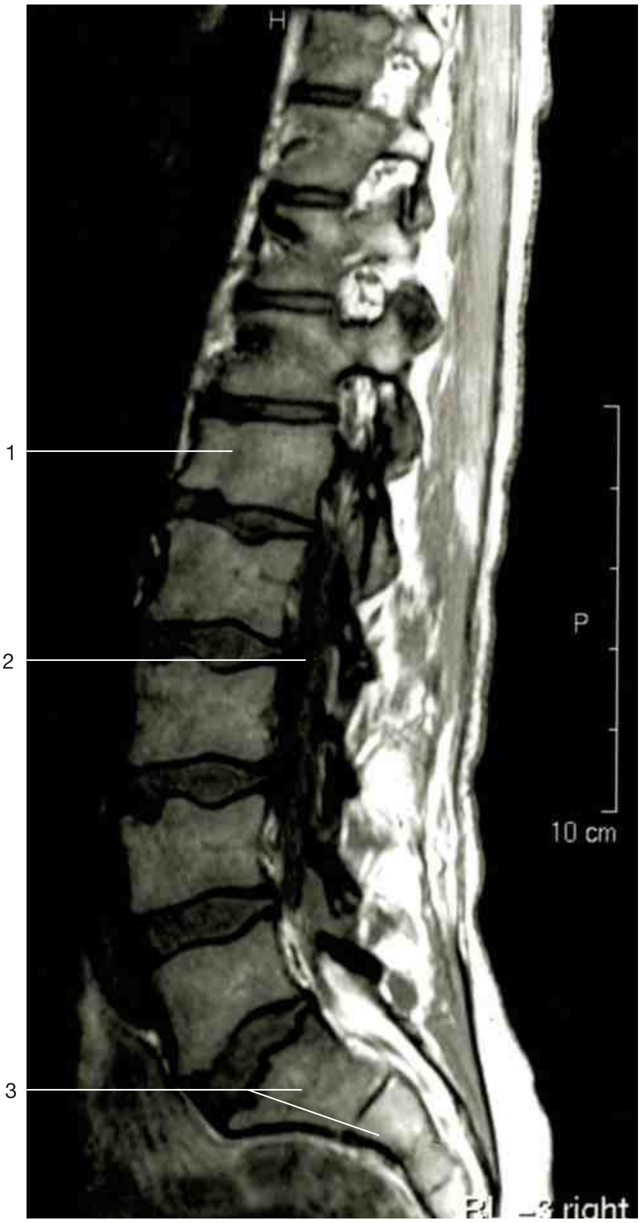


Lumbar part of vertebral column with pelvis (sagittal section, medial aspect).

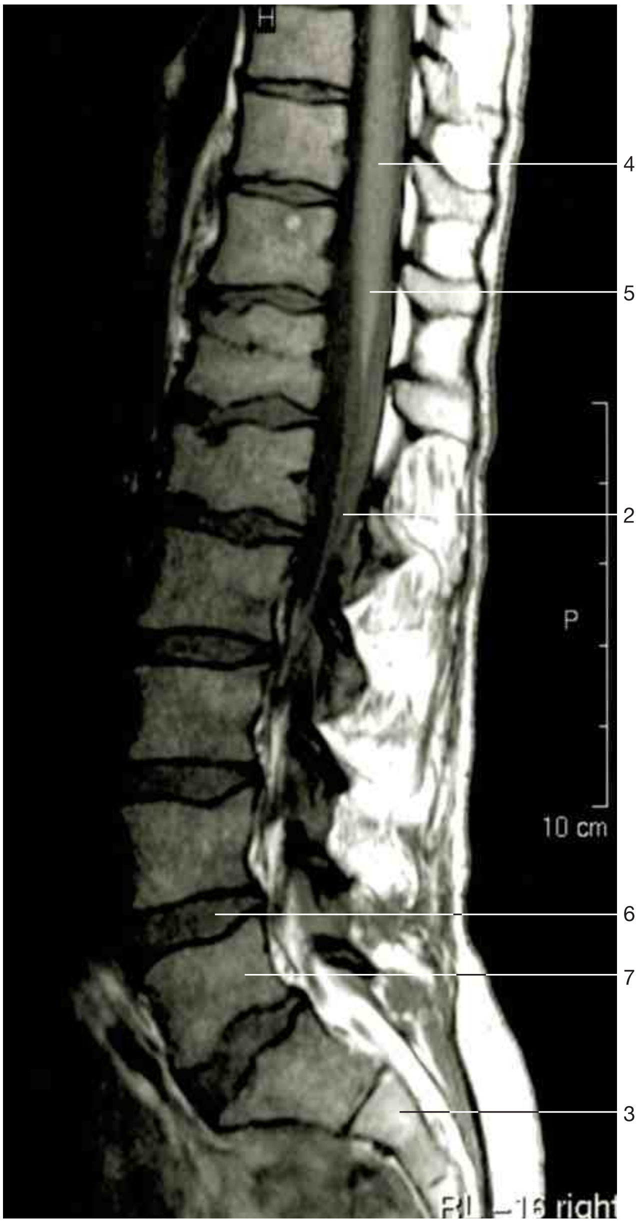
1 Eleventh rib
2 Body of third lumbar vertebra
3 Intervertebral disc
4 Body of fifth lumbar vertebra
5 Anterior superior iliac spine
6 Symphysial surface
7 Body of twelfth thoracic vertebra
8 Intervertebral foramen
9 Body of first lumbar vertebra
10 Vertebral canal
11 Spinous process of fifth lumbar vertebra
12 Sacrum (median sacral crest)
13 Promontory (promontorium)
14 Sacrum
15 Arcuate line
16 Coccyx
17 Ischial tuberosity
18 Sympathetic trunk with ganglia
19 Ureter
20 Iliohypogastric nerve (Th_{12}, L_1)
21 Ilio-inguinal nerve (L_1)
22 Femoral nerve (L_2–L_4)
23 Genitofemoral nerve (L_1, L_2)
24 Inferior hypogastric plexus
25 Ductus deferens
26 Urinary bladder
27 Medullary cone of spinal cord
28 Root filaments of spinal nerves
29 Subarachnoid space (filled with cerebrospinal fluid) (blue)
30 Terminal filament of spinal cord
31 Sacral plexus
32 Pelvic splanchnic nerves (nervi erigentes)
33 Rectum



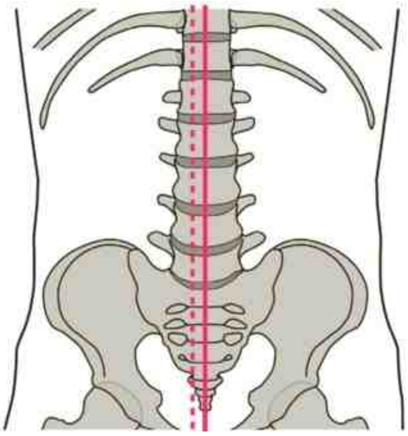
Vertebral canal with spinal cord and root filaments. Note the high location of the medullary cone. Sacral plexus and inferior hypogastric plexus are schematically shown.



Paramedian section of lumbar part of vertebral canal (MRI scan, dotted line in the schematic drawing below; courtesy of Prof. Bautz, Erlangen, Germany).

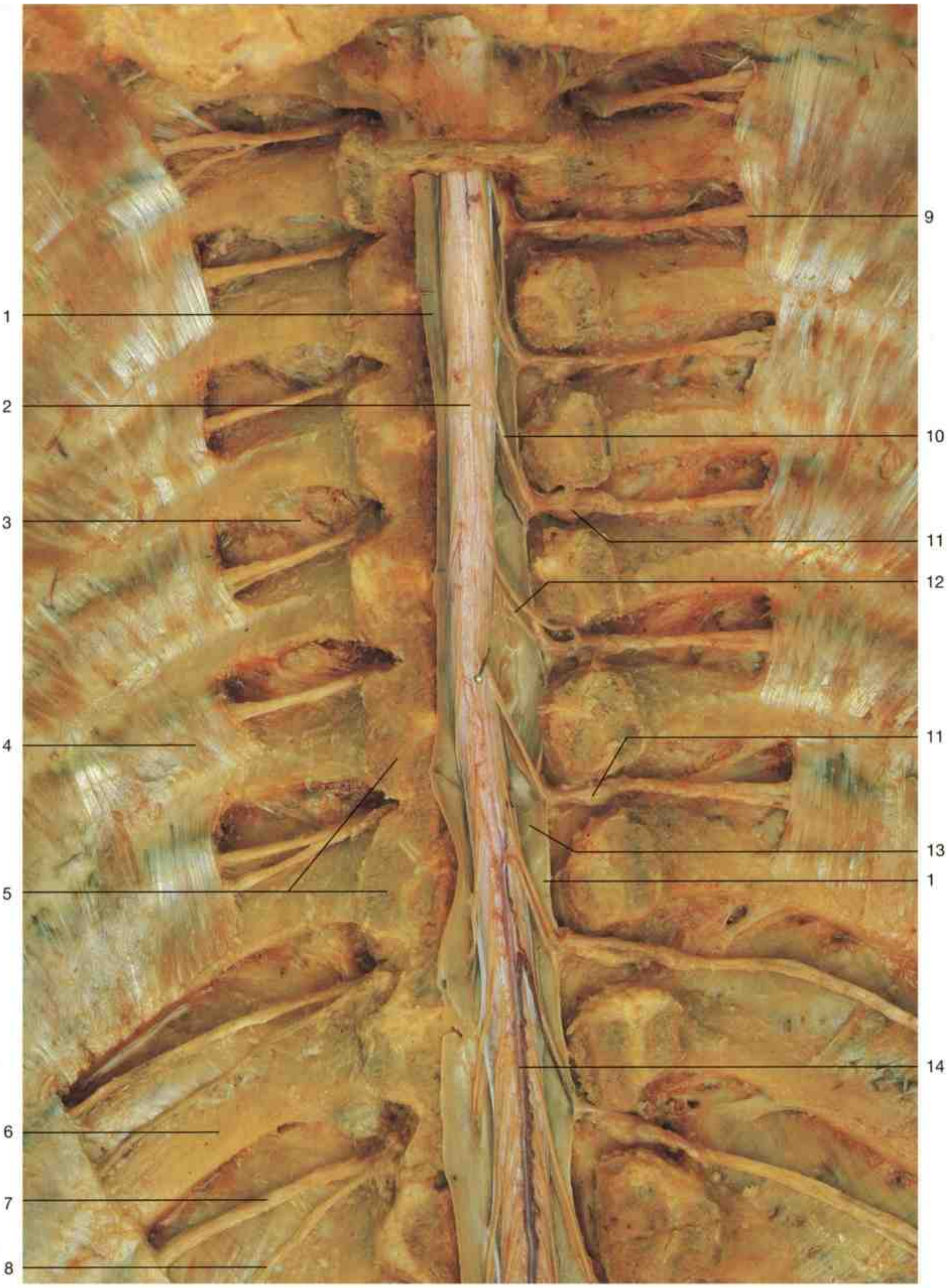


Median section of lumbar part of vertebral canal at the level of the medullary cone (MRI scan, continuous line in the schematic drawing below; courtesy of Prof. Bautz, Erlangen, Germany).



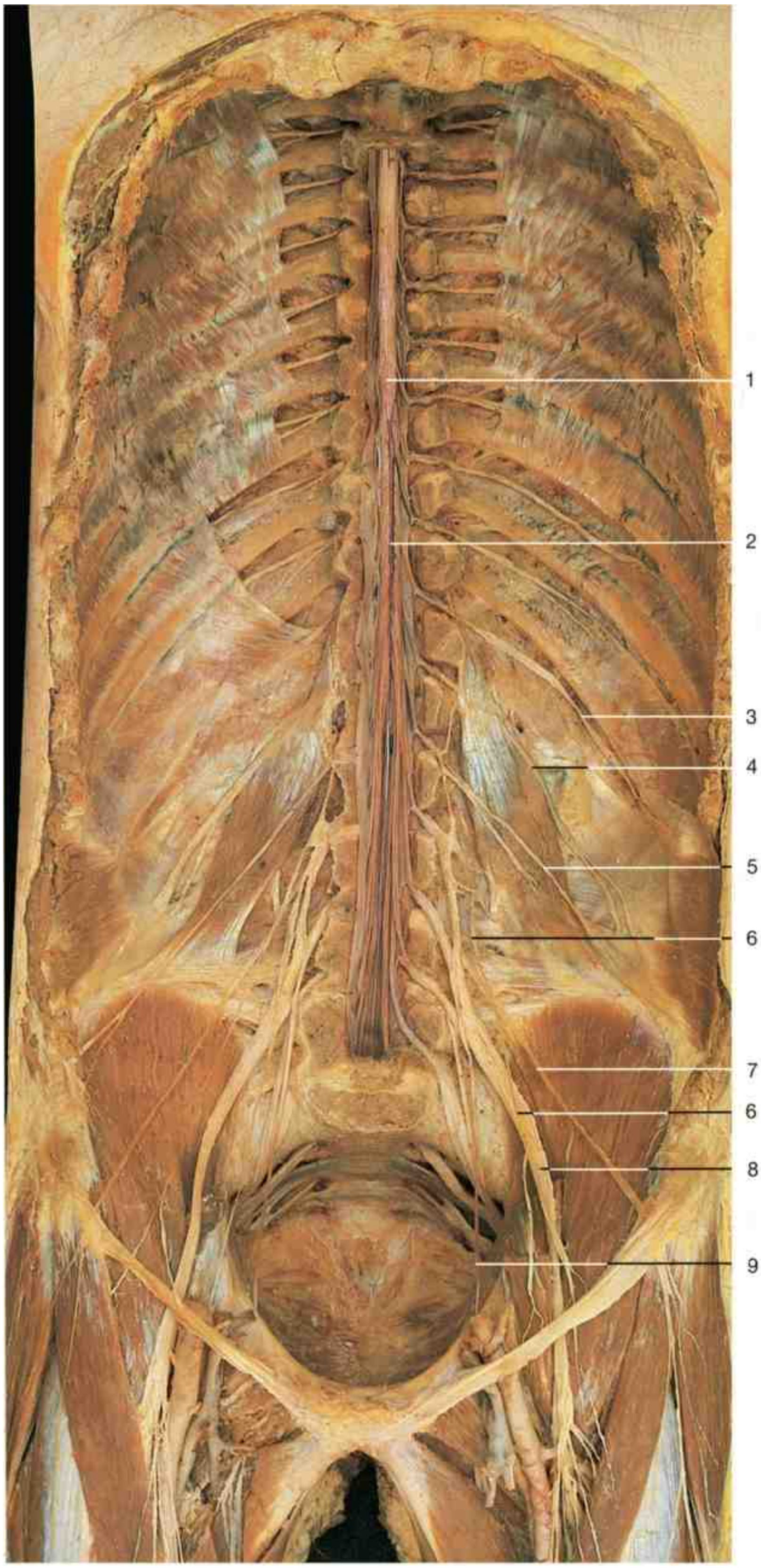
1 First lumbar vertebra
2 Root filaments of spinal nerves
3 Sacrum
4 Spinal cord
5 Medullary cone of spinal cord
6 Intervertebral disc between fourth and fifth lumbar vertebra
7 Fifth lumbar vertebra

Location of the sections shown above through the vertebral canal.



Spinal cord with intercostal nerves. Inferior thoracic region (anterior aspect). Anterior portion of thoracic vertebrae removed, dural sheath opened, and spinal cord slightly reflected to the right to display the dorsal and ventral roots.

1	Dura mater	6	Eleventh rib	10	Anterior root filaments
2	Spinal cord	7	Intercostal nerve	11	Spinal (dorsal root) ganglion
3	Costotransverse ligament	8	Collateral branch of intercostal nerve	12	Posterior root filaments
4	Innermost intercostal muscle	9	Intercostal nerve (entering the intermuscular interval)	13	Arachnoid mater and denticulate ligament
5	Vertebral arches (cut surfaces)			14	Anterior spinal artery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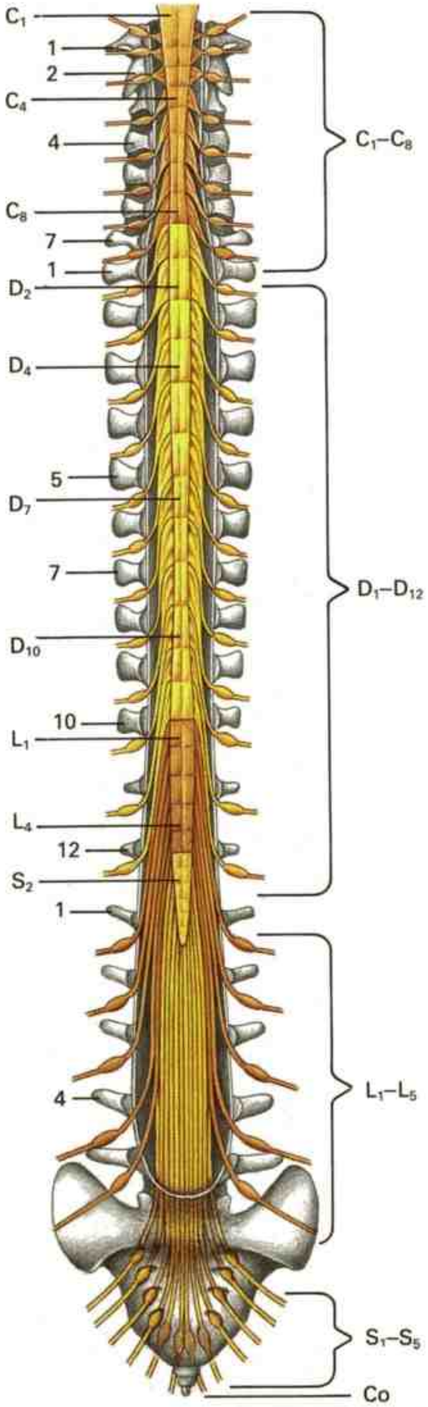
Spinal cord and lumbar plexus in situ (anterior aspect).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C₄
4
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D₂
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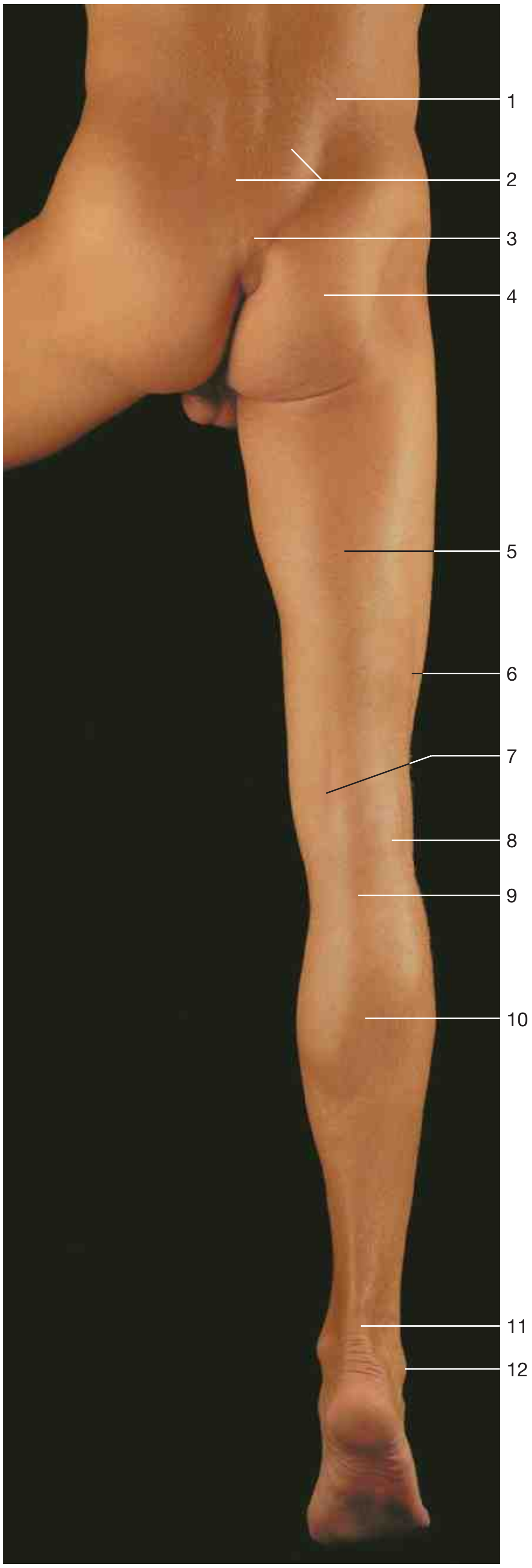
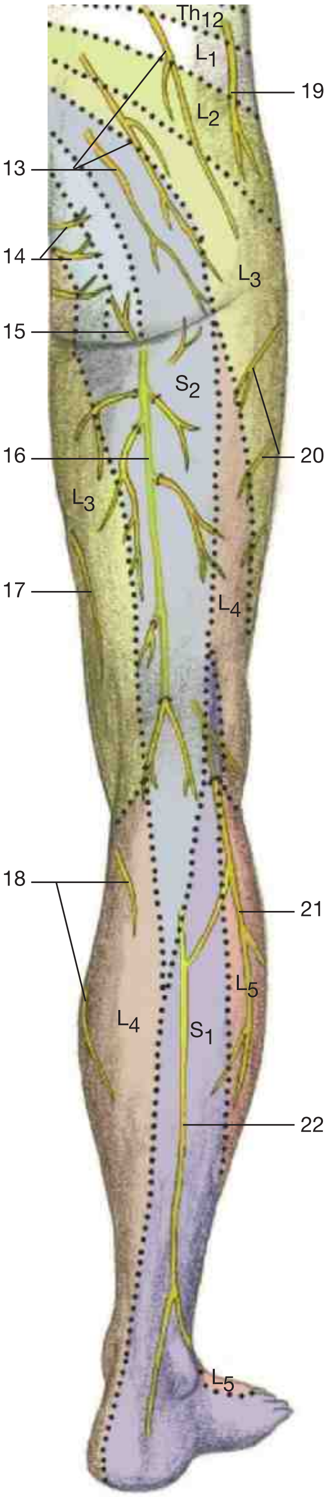
L₄
12
S₂
1
4
C₁–C₈
D₁–D₁₂
L₁–L₅
S₁–S₅
Co

Organization of spinal cord segments in relation to the vertebral column (anterior aspect).
C = cervical; D = thoracic;
L = lumbar; S = sacral segments;
Co = coccygeal bone.
Numbers indicate the related vertebrae.

1 Conus medullaris
2 Filum terminale
3 Subcostal nerve
4 Iliohypogastric nerve
5 Ilio-inguinal nerve
6 Genitofemoral nerve
7 Lateral femoral cutaneous nerve
8 Femoral nerve
9 Obturator nerve

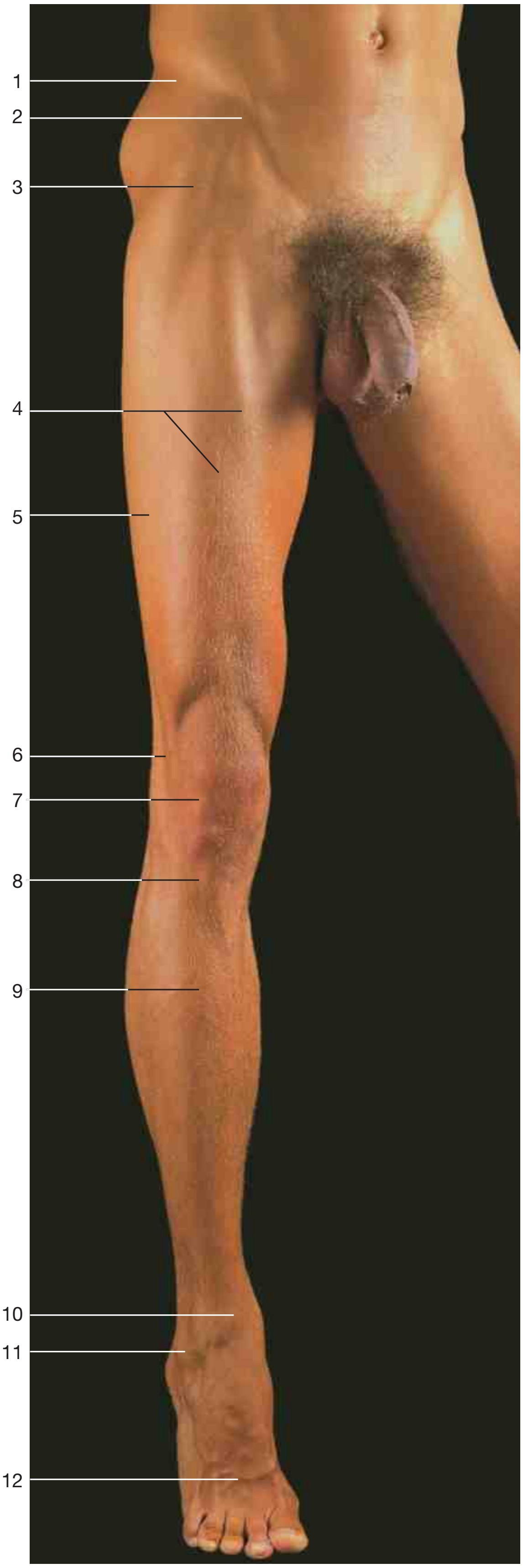


Surface anatomy of the right leg (posterior aspect).
Gluteal muscles contracted.

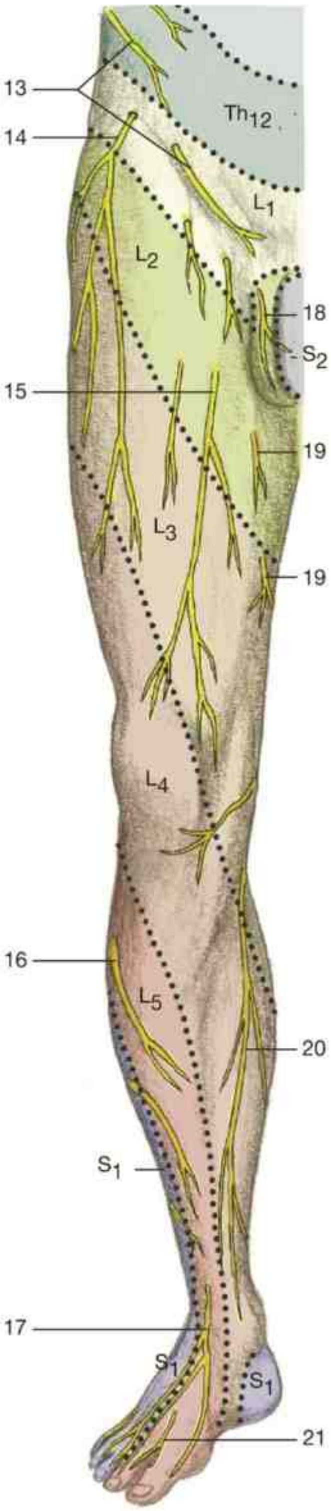


Cutaneous nerves of the lower limb (posterior aspect).
Dotted lines = border of segments.

1 Iliac crest
2 Sacrum
3 Coccyx
4 Gluteus maximus muscle
5 Dorsal muscles of the leg
6 Iliotibial tract
7 Tendon of semimembranosus muscle
8 Tendon of biceps femoris muscle
9 Popliteal fossa
10 Triceps surae muscle
11 Calcaneal or Achilles tendon
12 Lateral malleolus
13 Superior cluneal nerves
14 Middle cluneal nerves
15 Inferior cluneal nerves
16 Posterior femoral cutaneous nerve
17 Obturator nerve
18 Saphenous nerve
19 Iliohypogastric nerve
20 Branch of lateral femoral cutaneous nerves
21 Common peroneal nerve
22 Sural nerve

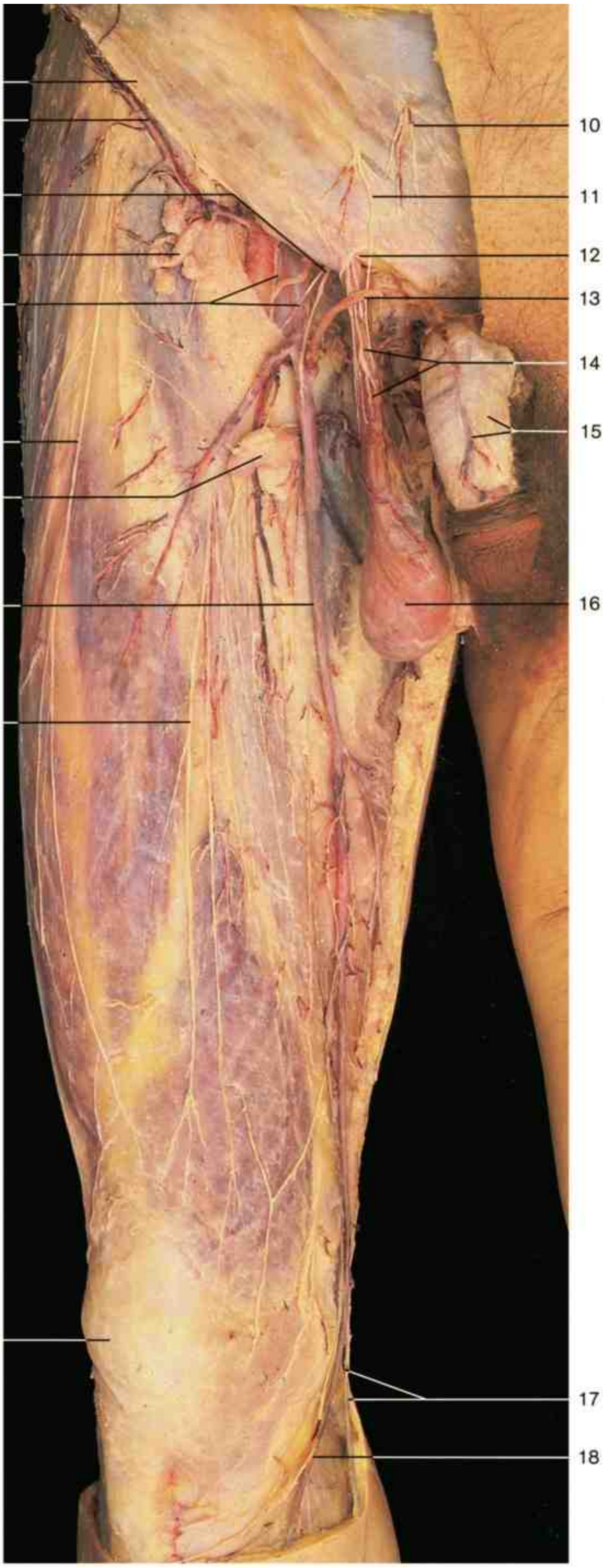


Surface anatomy of the right leg (anterior aspect).



Cutaneous nerves of the lower limb (anterior aspect).
Dotted lines = border of segments.

1	Iliac crest
2	Anterior superior iliac spine
3	Tensor fasciae latae muscle
4	Quadriceps femoris muscle
5	Iliotibial tract
6	Tendon of biceps femoris muscle
7	Patella
8	Patellar ligament
9	Tibia
10	Tendon of tibialis anterior muscle
11	Lateral malleolus
12	Venous network of dorsum of foot
13	Iliohypogastric nerve
14	Lateral femoral cutaneous nerve
15	Femoral nerve
16	Common peroneal nerve
17	Superficial peroneal nerve
18	Ilio-inguinal nerve
19	Obturator nerve
20	Saphenous nerve
21	Deep peroneal nerve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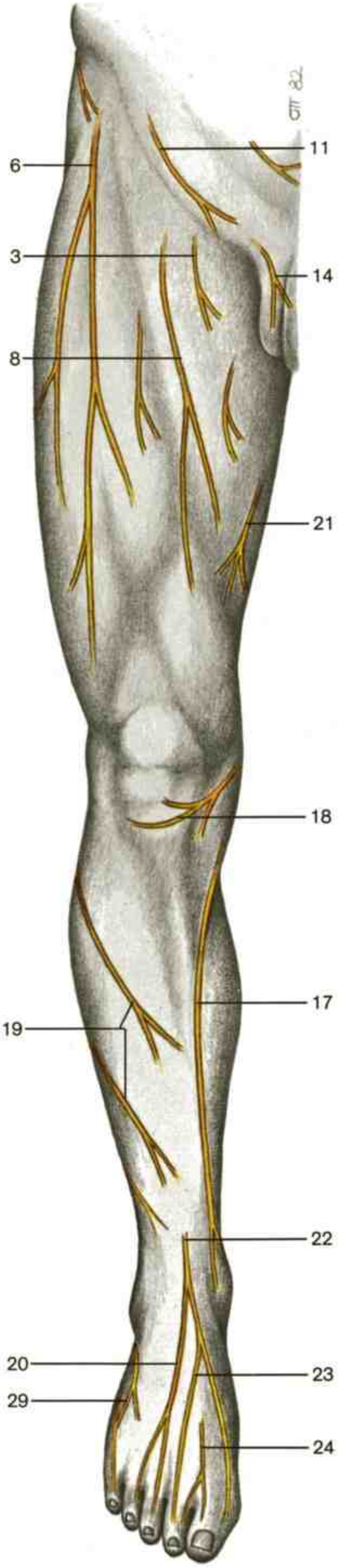
Cutaneous nerves and veins of thigh (anterior aspect).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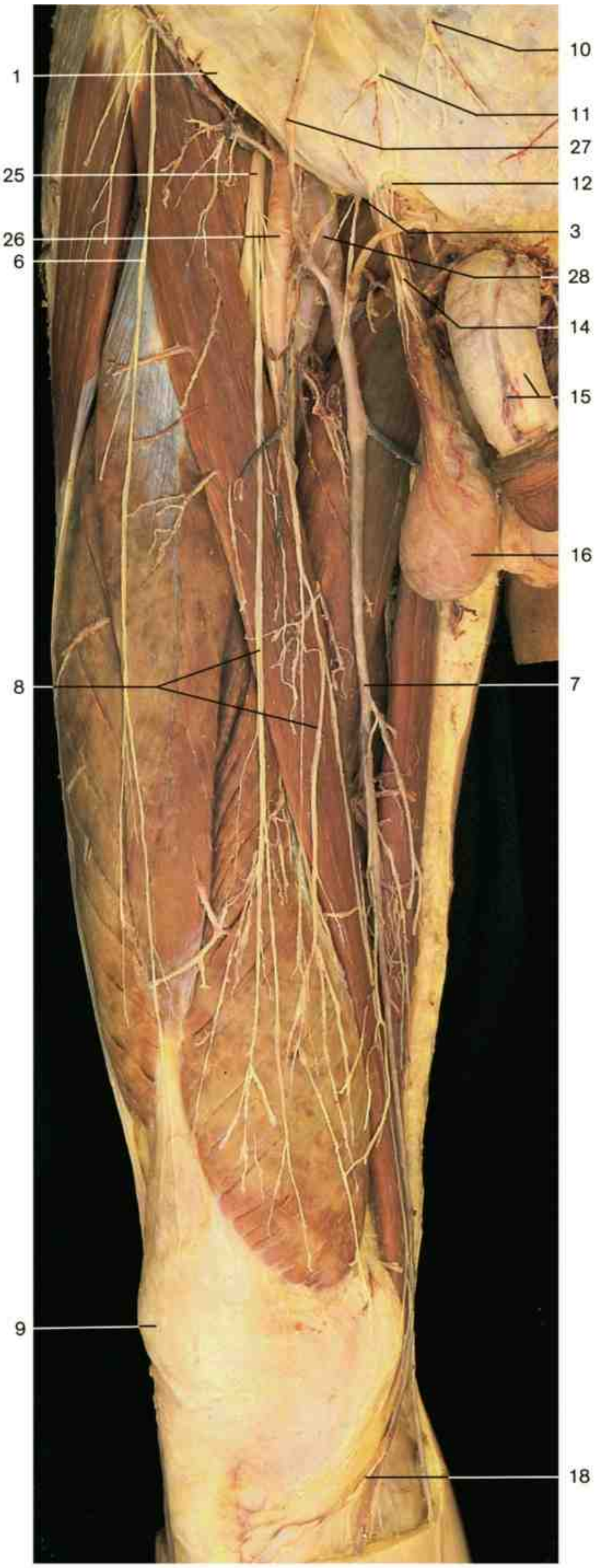
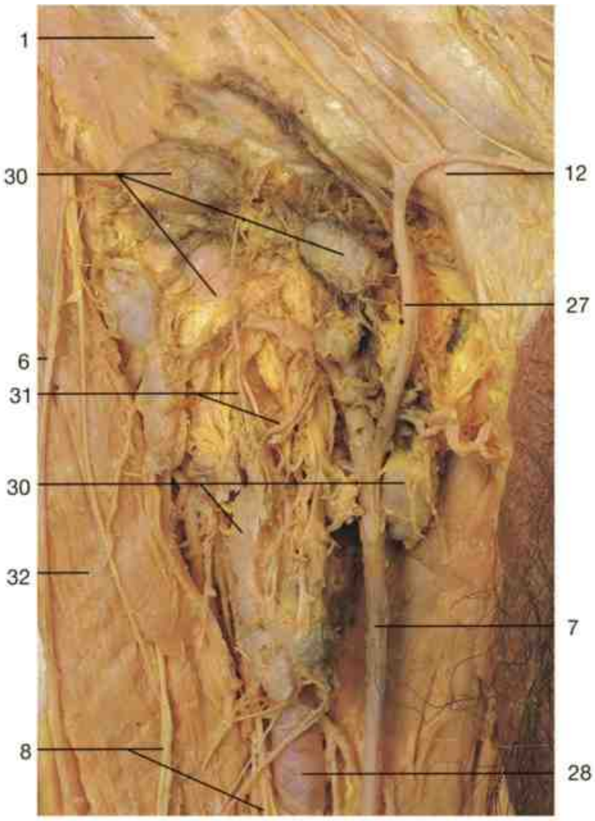
Cutaneous nerves of lower limb (anterior aspect). (Schematic drawing.)

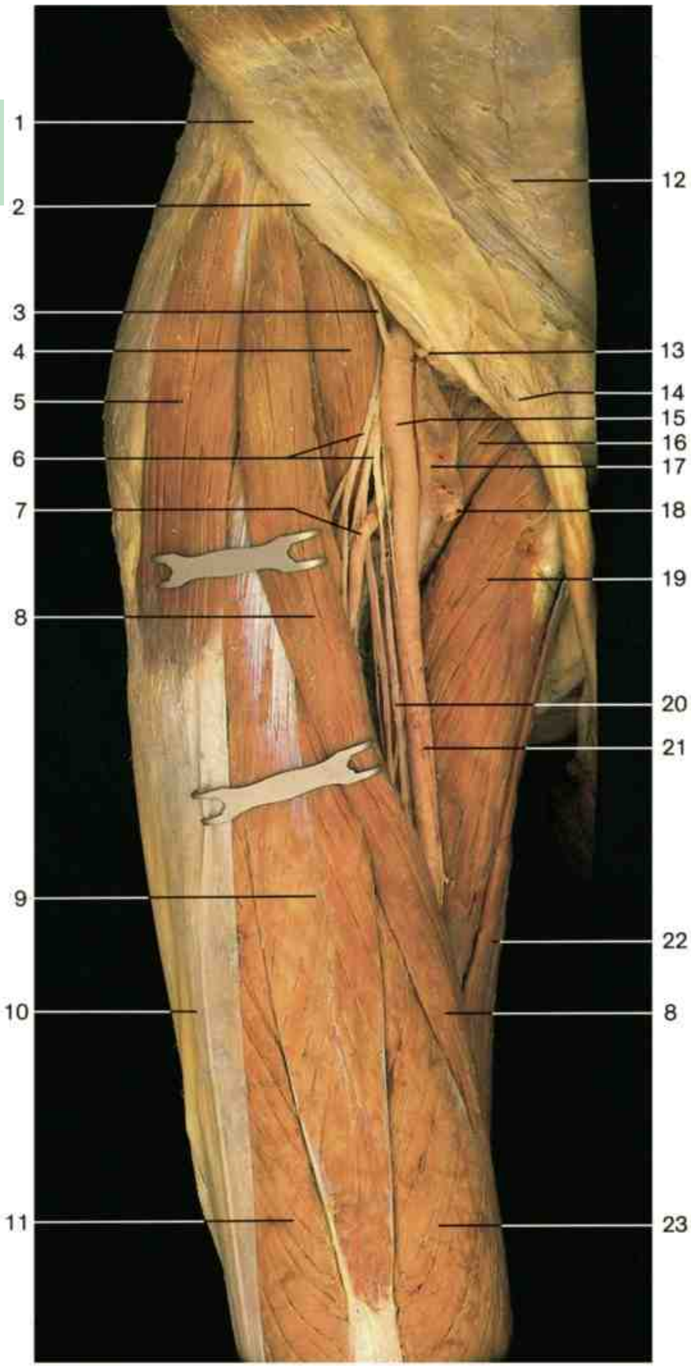


Cutaneous nerves and veins of thigh (anterior aspect). The fascia lata and fasciae of the thigh muscles have been removed.

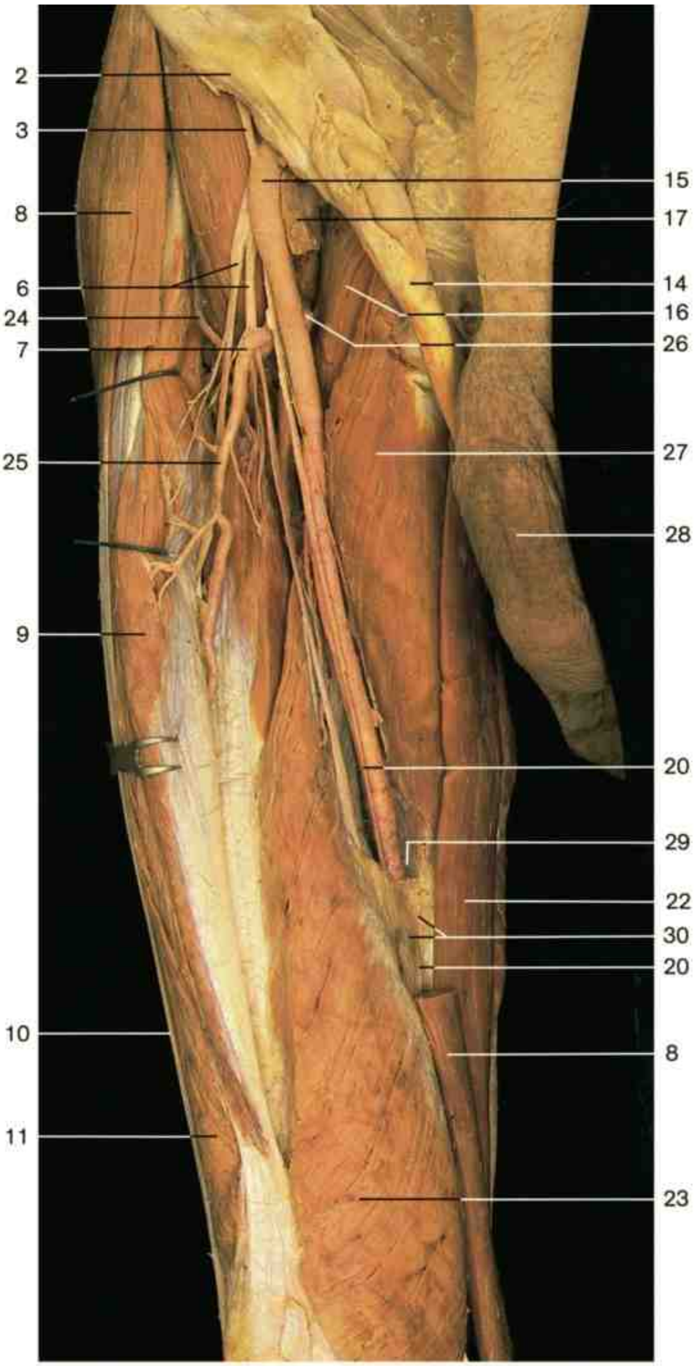
1 Inguinal ligament
2 Superficial circumflex iliac vein
3 Femoral branch of genitofemoral nerve
4 Superficial inguinal lymph nodes
5 Saphenous opening with femoral artery and vein
6 Lateral femoral cutaneous nerve
7 Great saphenous vein
8 Anterior cutaneous branches of femoral nerve
9 Patella
10 Terminal branches of subcostal nerve
11 Terminal branches of iliohypogastric nerve
12 Superficial inguinal ring
13 External pudendal vein
14 Spermatic cord with genital branch of genitofemoral nerve
15 Penis with superficial dorsal vein of penis
16 Testis and its coverings
17 Saphenous nerve
18 Infrapatellar branch of saphenous nerve
19 Lateral sural cutaneous nerves
20 Intermediate dorsal cutaneous branch of superficial peroneal nerve
21 Cutaneous branch of obturator nerve
22 Superficial peroneal nerve
23 Medial dorsal cutaneous branch of superficial peroneal nerve
24 Deep peroneal nerve
25 Femoral nerve
26 Femoral artery
27 Superficial epigastric vein
28 Femoral vein
29 Lateral dorsal cutaneous branch of sural nerve
30 Inguinal nodes (enlarged)
31 Lympathic vessels
32 Sartorius muscle



Inguinal nodes with lymphatic vessels (anterior aspect).

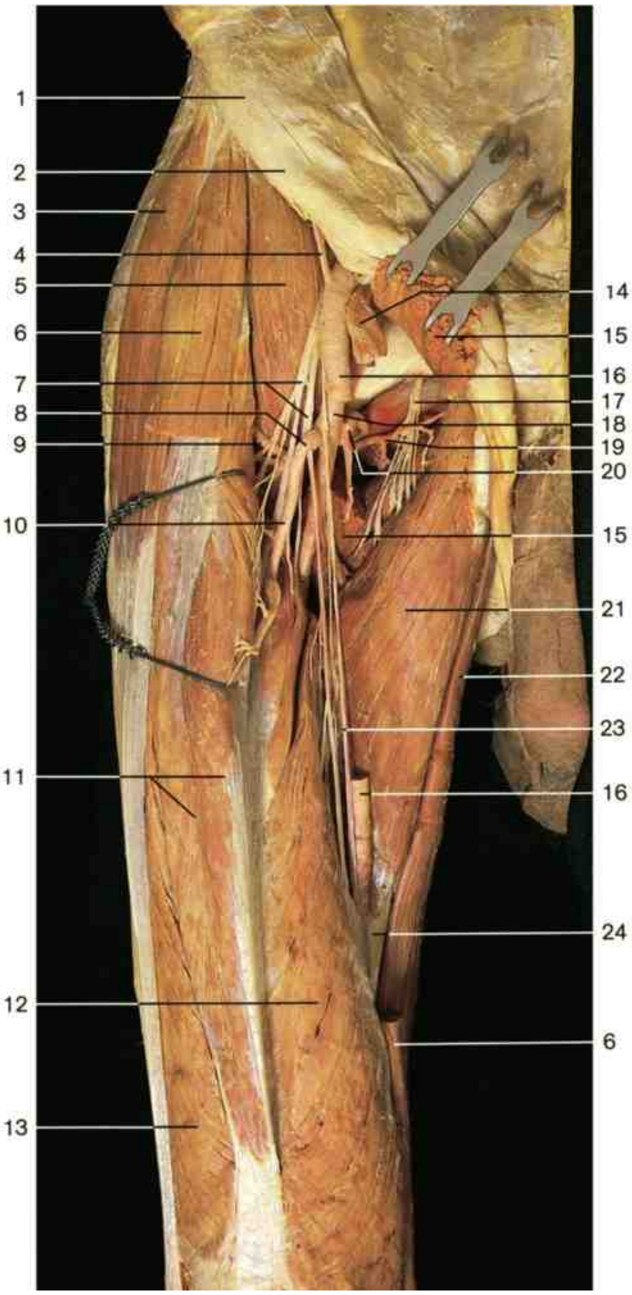


Anterior region of right thigh (anterior aspect). The fascia lata has been removed, and the sartorius muscle has been slightly reflected.

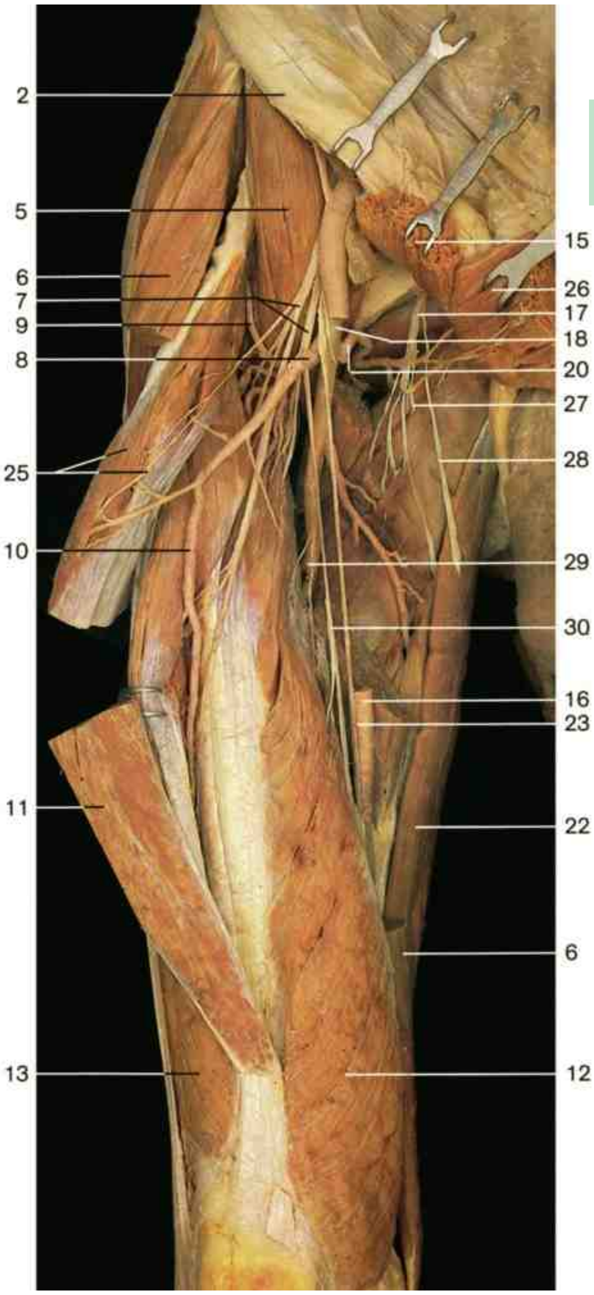


Anterior region of right thigh (anterior aspect). The fascia lata has been removed, and the sartorius muscle has been divided.

1 Anterior superior iliac spine
2 Inguinal ligament
3 Deep circumflex iliac artery
4 Iliopsoas muscle
5 Tensor fasciae latae muscle
6 Femoral nerve
7 Lateral circumflex femoral artery
8 Sartorius muscle
9 Rectus femoris muscle
10 Iliotibial tract
11 Vastus lateralis muscle
12 Anterior sheath of rectus abdominis muscle
13 Inferior epigastric artery
14 Spermatic cord
15 Femoral artery
16 Pectineus muscle
17 Femoral vein
18 Great saphenous vein (divided)
19 Adductor longus muscle
20 Saphenous nerve
21 Muscular branch of femoral nerve
22 Gracilis muscle
23 Vastus medialis muscle
24 Ascending branch of lateral circumflex femoral artery
25 Descending branch of lateral circumflex femoral artery
26 Medial circumflex femoral artery
27 Adductor longus muscle
28 Penis
29 Entrance to adductor canal
30 Vasto-adductor membrane of fascia beneath sartorius muscle

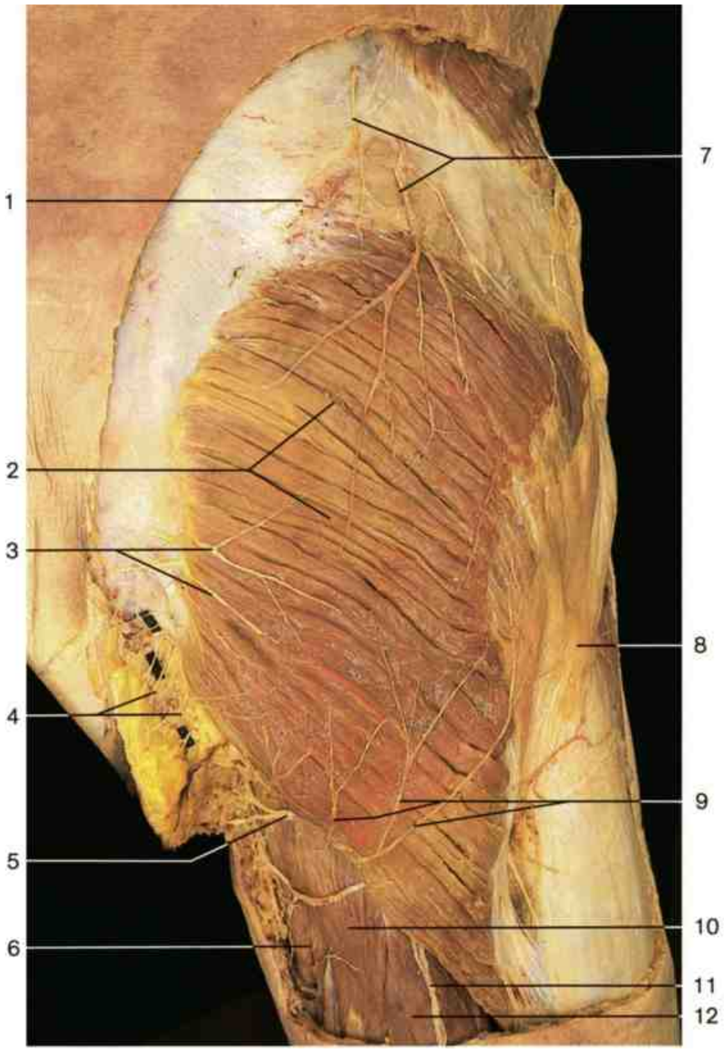


Anterior region of right thigh (anterior aspect). The fascia lata has been removed. Sartorius muscle, pectineus muscle, and femoral artery have been cut to display the deep femoral artery with its branches. The rectus femoris muscle has been slightly reflected.



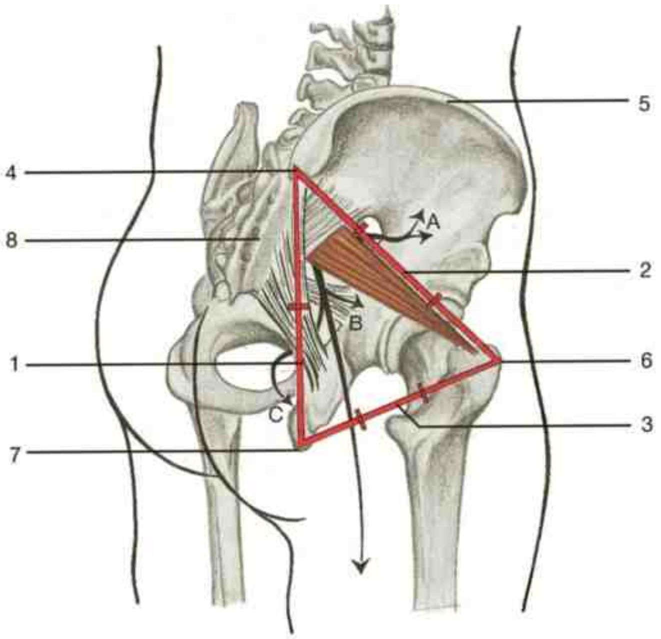
Anterior region of right thigh (anterior aspect). The sartorius, pectineus, adductor longus, and rectus femoris muscles have been divided and reflected. The greater part of the femoral artery has been removed.

1	Anterior superior iliac spine
2	Inguinal ligament
3	Tensor fasciae latae muscle
4	Deep circumflex iliac artery
5	Iliopsoas muscle
6	Sartorius muscle (cut)
7	Femoral nerve
8	Lateral circumflex femoral artery
9	Ascending branch of lateral circumflex femoral artery
10	Descending branch of lateral circumflex femoral artery
11	Rectus femoris muscle
12	Vastus medialis muscle
13	Vastus lateralis muscle
14	Femoral vein
15	Pectineus muscle (cut)
16	Femoral artery (cut)
17	Obturator nerve
18	Profunda femoris artery
19	Ascending branch of medial circumflex femoral artery
20	Medial circumflex femoral artery
21	Adductor longus muscle
22	Gracilis muscle
23	Saphenous nerve
24	Distal part of vasto-adductor membrane
25	Rectus femoris muscle with muscular branch of femoral nerve
26	Adductor longus muscle (divided)
27	Posterior branch of obturator nerve
28	Anterior branch of obturator nerve
29	Point at which perforating artery branches off from profunda femoris artery
30	Muscular branch of femoral nerve to vastus medialis muscle



Gluteal region, right side (posterior aspect).

1 Iliac crest
2 Gluteus maximus muscle
3 Middle cluneal nerves
4 Anococcygeal nerves
5 Perineal branch of posterior femoral cutaneous nerve
6 Adductor magnus muscle
7 Superior cluneal nerves
8 Position of greater trochanter
9 Inferior cluneal nerves
10 Semitendinosus muscle
11 Posterior femoral cutaneous nerve
12 Long head of biceps femoris muscle



Gluteal region, right side (postero-lateral aspect). Location of sciatic foramina in relation to the bones (schematic drawing).

A **Suprapiriform foramen**
(of greater sciatic foramen)

Superior gluteal artery, vein, and nerve

B **Infrapiriform foramen**
(of greater sciatic foramen)

Sciatic nerve
Inferior gluteal artery, vein, and nerve
Posterior femoral cutaneous nerve
Internal pudendal artery and vein
Pudendal nerve

C **Lesser sciatic foramen**

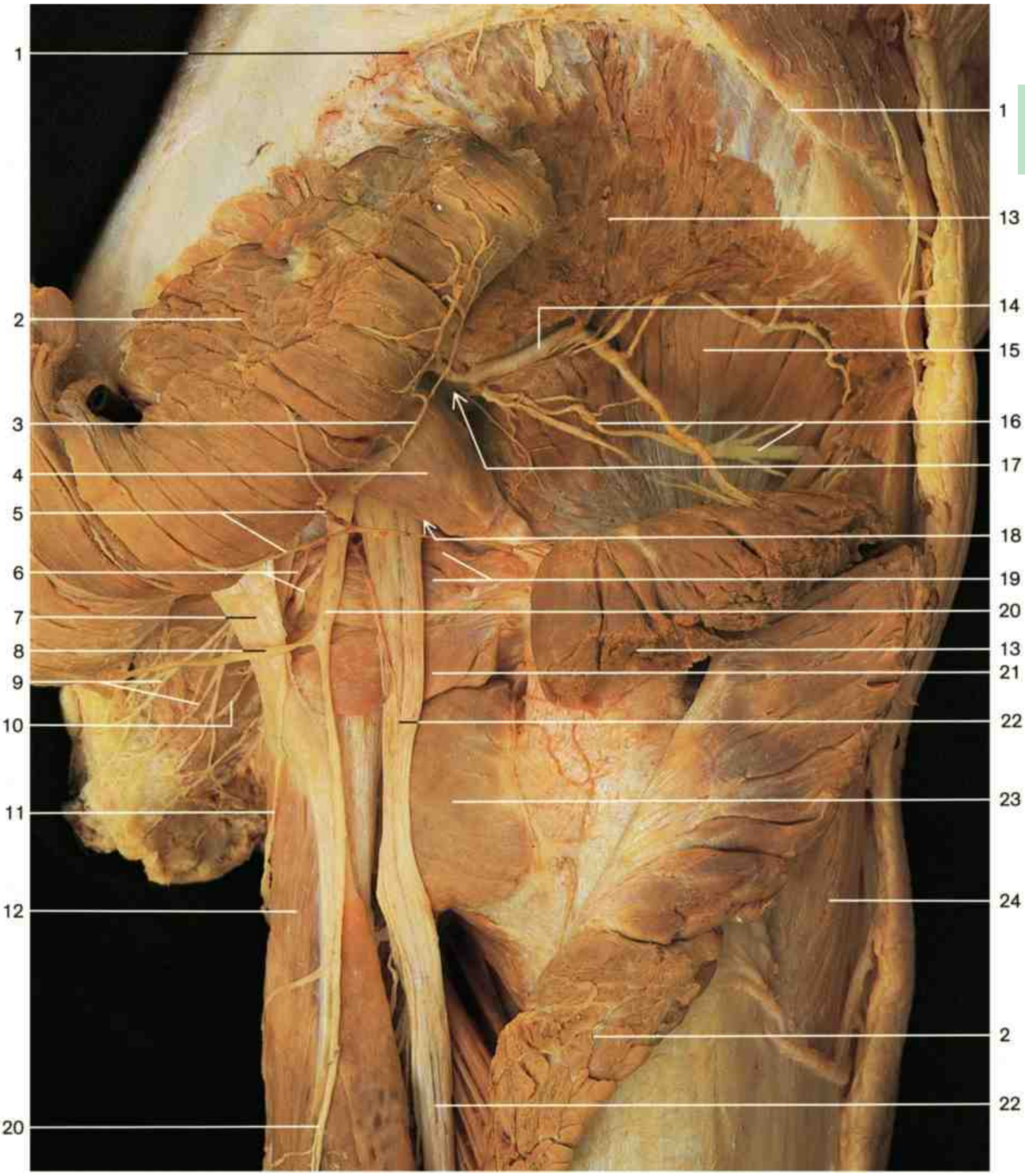
Pudendal nerve
Internal pudendal artery and vein

Red lines

1 Spine-tuber line:
the infrapiriform foramen is situated in the middle of this line
2 Spine-trochanter line:
the suprapiriform foramen is located in the upper third
3 Tuber-trochanter line:
the ischiadic nerve can be found between the middle and posterior third

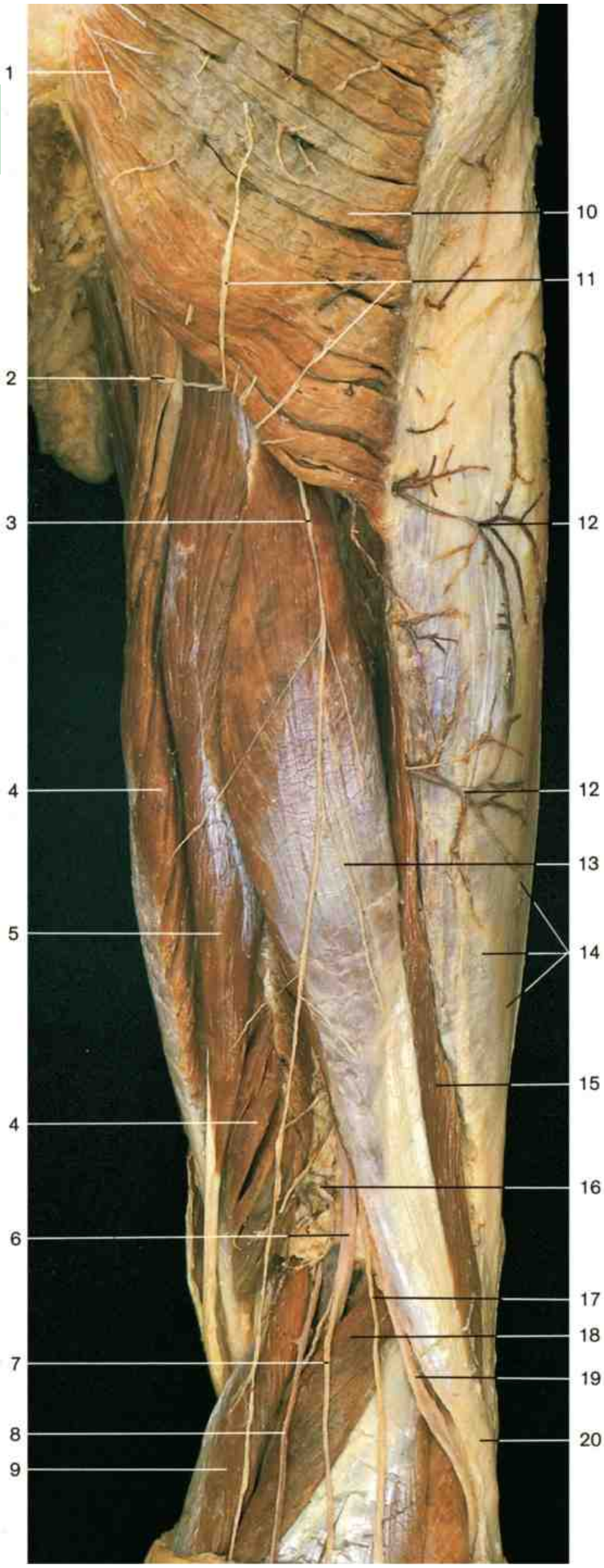
Other structures

4 Posterior superior iliac spine
5 Iliac crest
6 Greater trochanter
7 Ischial tuberosity
8 Sacrum



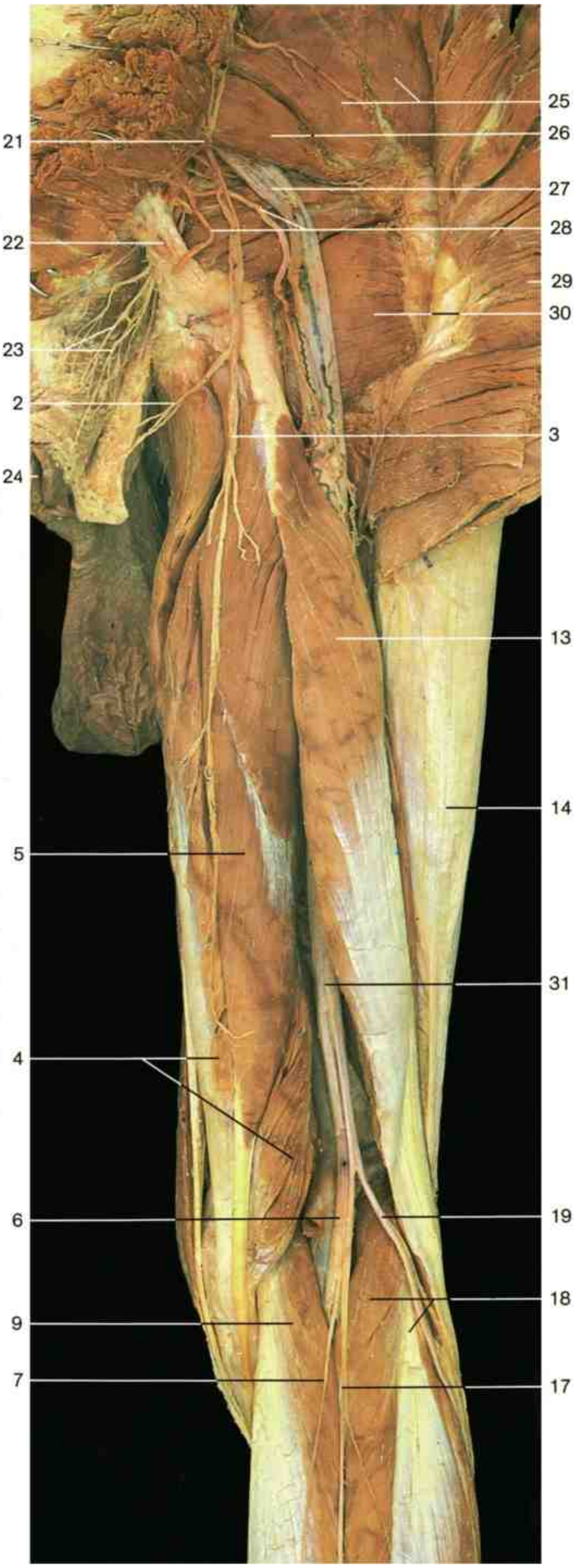
Gluteal region, right side (posterior aspect). The gluteus maximus and gluteus medius muscles have been divided and reflected. Notice the position of the foramina above and below the piriformis muscle and the lesser sciatic foramen.

1 Iliac crest
2 Gluteus maximus muscle (cut)
3 Inferior gluteal nerve
4 Piriformis muscle
5 Muscular branches of inferior gluteal artery
6 Pudendal nerve and internal pudendal artery within the lesser sciatic foramen (entrance to the pudendal canal)
7 Sacrotuberous ligament
8 Inferior cluneal nerve
9 Inferior rectal nerves
10 Inferior rectal arteries
11 Perforating cutaneous nerve
12 Long head of biceps femoris muscle
13 Gluteus medius muscle (cut)
14 Deep branch of superior gluteal artery
15 Gluteus minimus muscle
16 Superior gluteal nerve
17 Suprapiriform foramen } greater sciatic foramen
18 Infrapiriform foramen }
19 Tendon of obturator internus and superior gemellus muscles
20 Posterior femoral cutaneous nerve
21 Inferior gemellus muscle
22 Sciatic nerve
23 Quadratus femoris muscle
24 Tensor fasciae latae muscle



Cutaneous nerves of thigh (posterior aspect).
The fascia lata and the fasciae of muscles have been removed.

1 Middle cluneal nerves
2 Perineal branch of posterior femoral cutaneous nerve
3 Posterior femoral cutaneous nerve
4 Semimembranosus muscle
5 Semitendinosus muscle
6 Tibial nerve
7 Medial sural cutaneous nerve
8 Small saphenous vein
9 Medial head of gastrocnemius muscle
10 Gluteus maximus muscle
11 Inferior cluneal nerves
12 Cutaneous veins
13 Long head of biceps femoris muscle
14 Iliotibial tract
15 Short head of biceps femoris muscle
16 Popliteal fossa
17 Lateral sural cutaneous nerve
18 Lateral head of gastrocnemius muscle
19 Common peroneal nerve
20 Tendon of biceps femoris muscle
21 Inferior gluteal nerve
22 Sacrotuberous ligament
23 Inferior rectal branches of pudendal nerve
24 Anus
25 Gluteus medius muscle
26 Piriformis muscle
27 Sciatic nerve
28 Inferior gluteal artery
29 Gluteus maximus muscle (cut)
30 Quadratus femoris muscle
31 Sciatic nerve dividing into its two branches: the common peroneal nerve and the tibial nerve
32 Muscular branches of sciatic nerve to hamstring muscles
33 Popliteal artery
34 Popliteal vein
35 Small saphenous vein (cut)
36 Long head of biceps femoris muscle (cut)
37 Superficial peroneal nerve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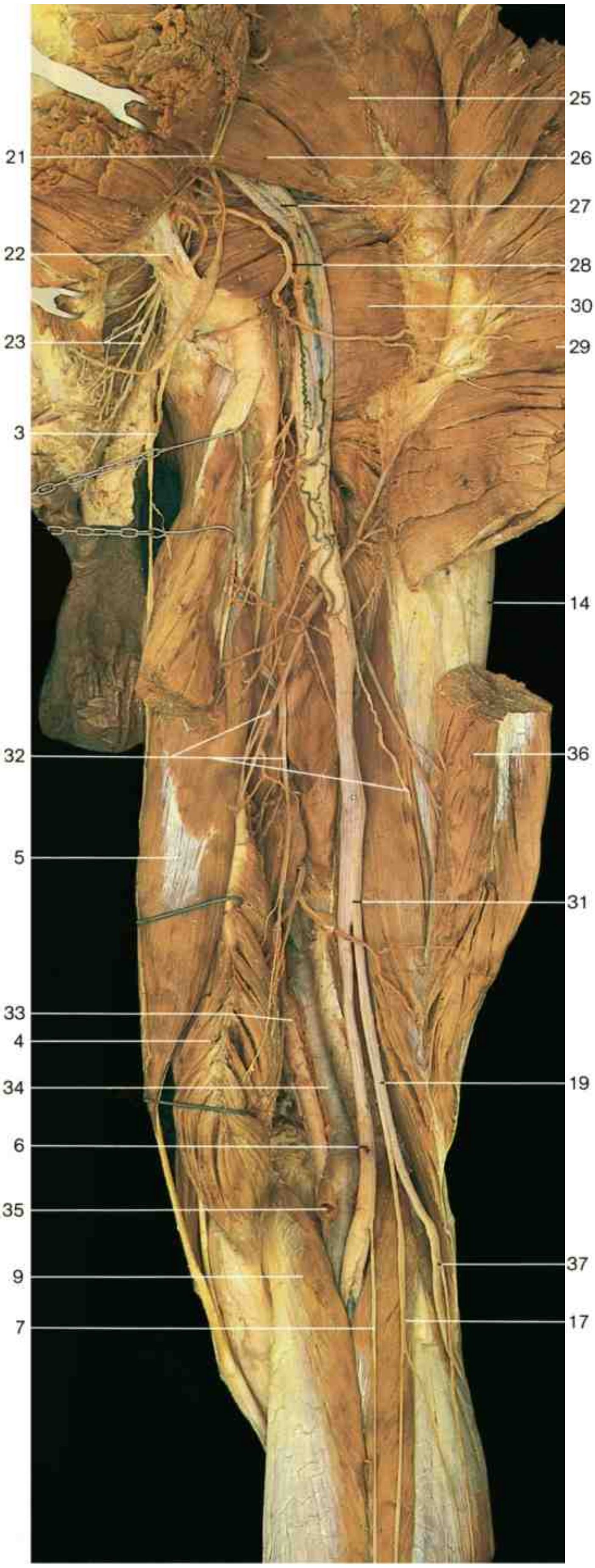
Gluteal region and posterior region of right thigh (posterior aspect). The gluteus maximus muscle has been divided and reflected.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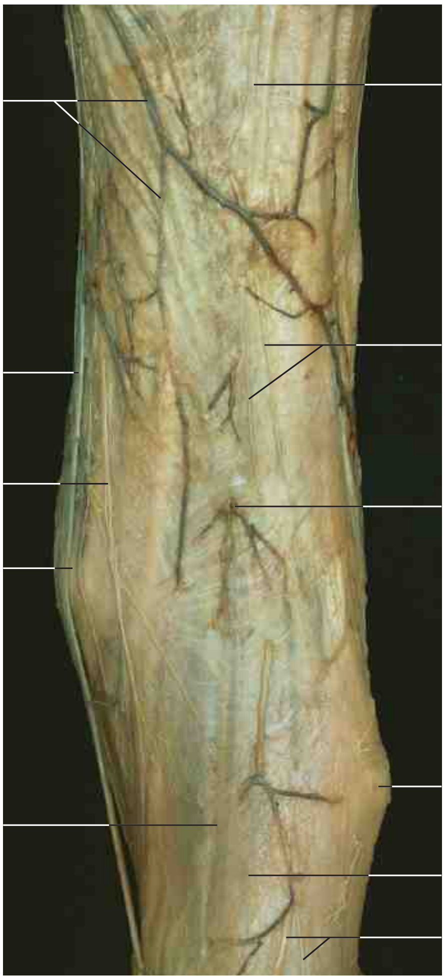
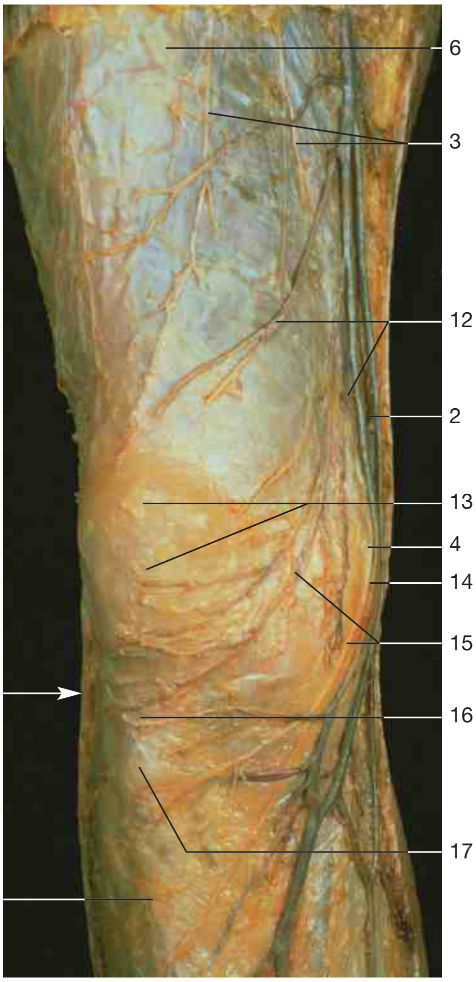
Gluteal region and posterior region of right thigh (posterior aspect). The gluteus maximus muscle and the long head of the biceps femoris muscle have been divided and reflected.

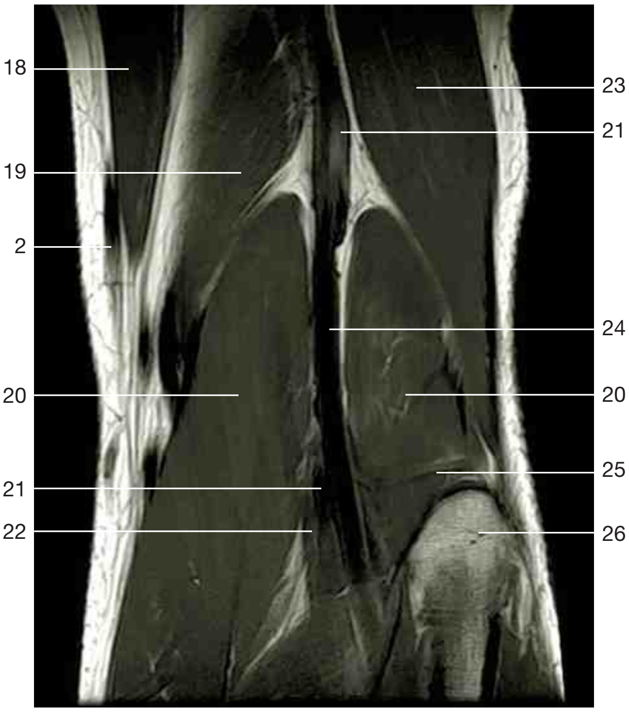


Posterior region of right knee, cutaneous nerves and veins (posterior aspect).

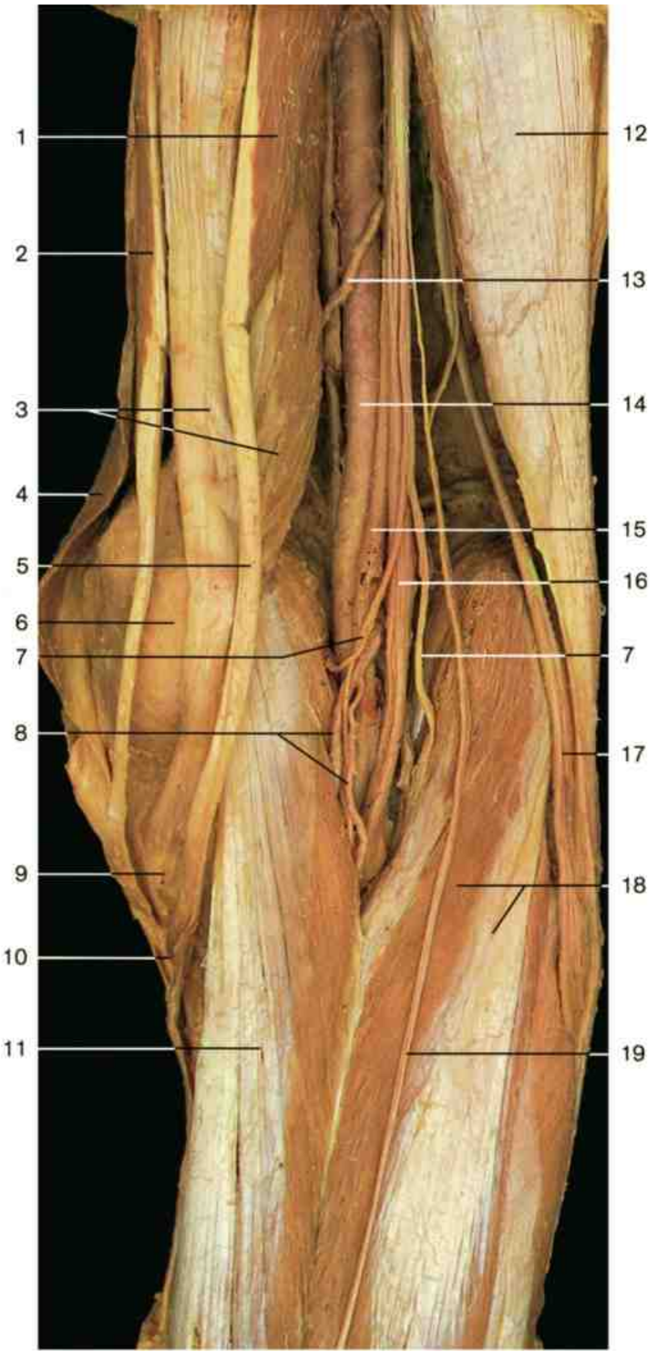


Anterior region of right knee, cutaneous nerves and veins (anterior aspect).

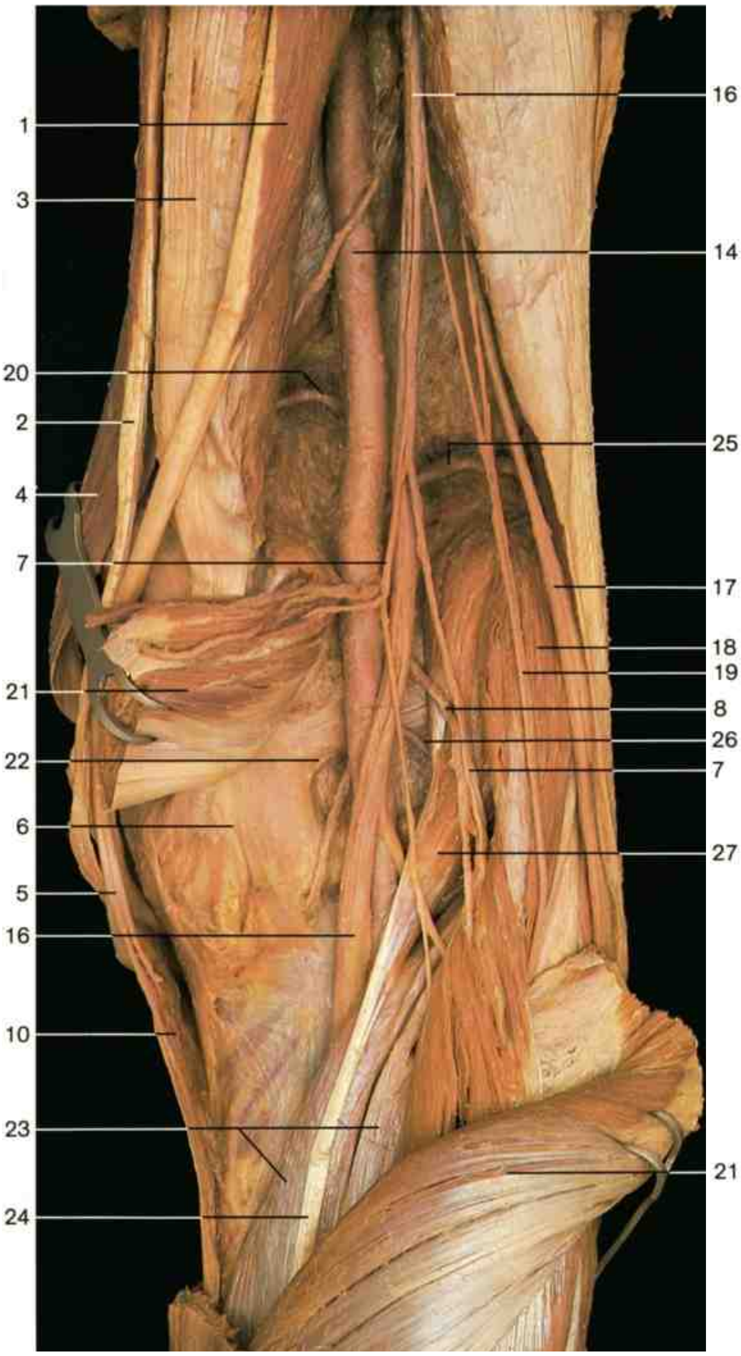
1 Cutaneous veins (tributaries of great saphenous vein)
2 Great saphenous vein
3 Cutaneous branch of femoral nerve
4 Position of medial condyle of femur
5 Position of small saphenous vein
6 Fascia lata
7 Terminal branches of posterior femoral cutaneous nerve
8 Cutaneous veins of popliteal fossa
9 Position of head of fibula
10 Superficial layer of fascia cruris
11 Lateral sural cutaneous nerve
12 Venous network around knee
13 Patella
14 Saphenous nerve
15 Infrapatellar branch of saphenous nerve
16 Patellar ligament
17 Position of tuberosity of tibia
18 Sartorius muscle
19 Semimembranosus muscle
20 Gastrocnemius muscle
21 Popliteal vein
22 Tibial nerve
23 Biceps femoris muscle
24 Popliteal artery
25 Lateral inferior genicular artery
26 Fibula



Coronal section of popliteal fossa (MRI scan; from Heuck et al., MRT-Atlas, 2009).

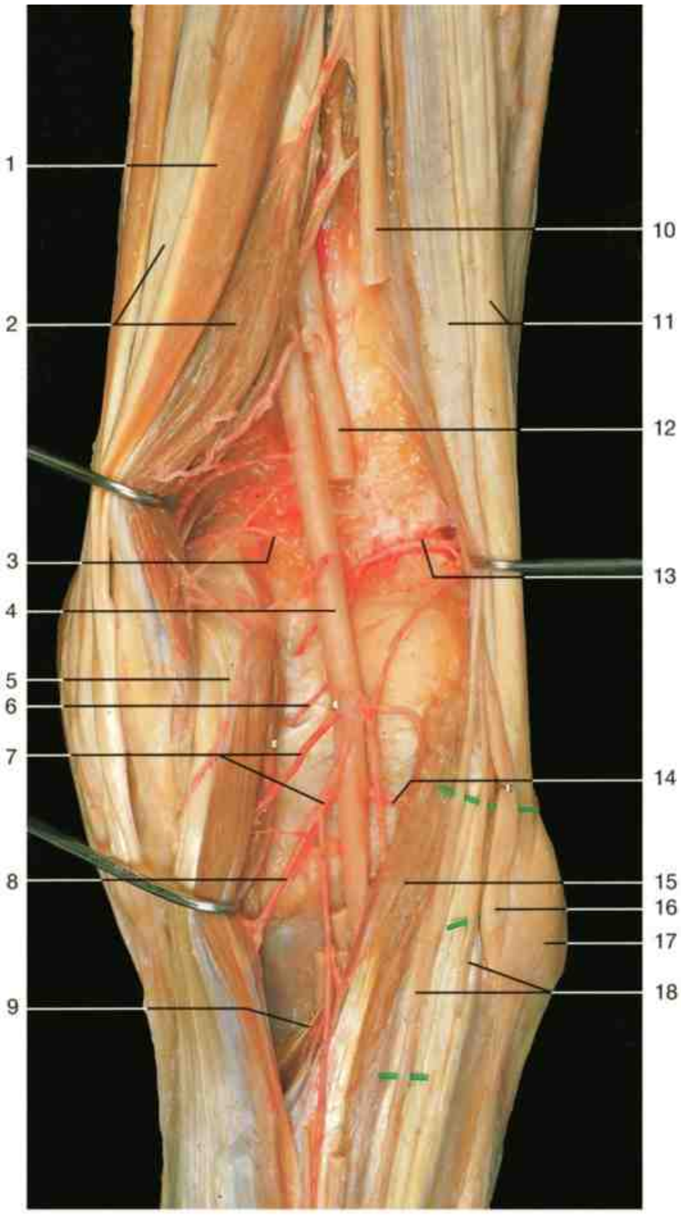


Right leg, popliteal fossa, middle layer (posterior aspect). The gastrocnemius muscle has been divided and reflected.

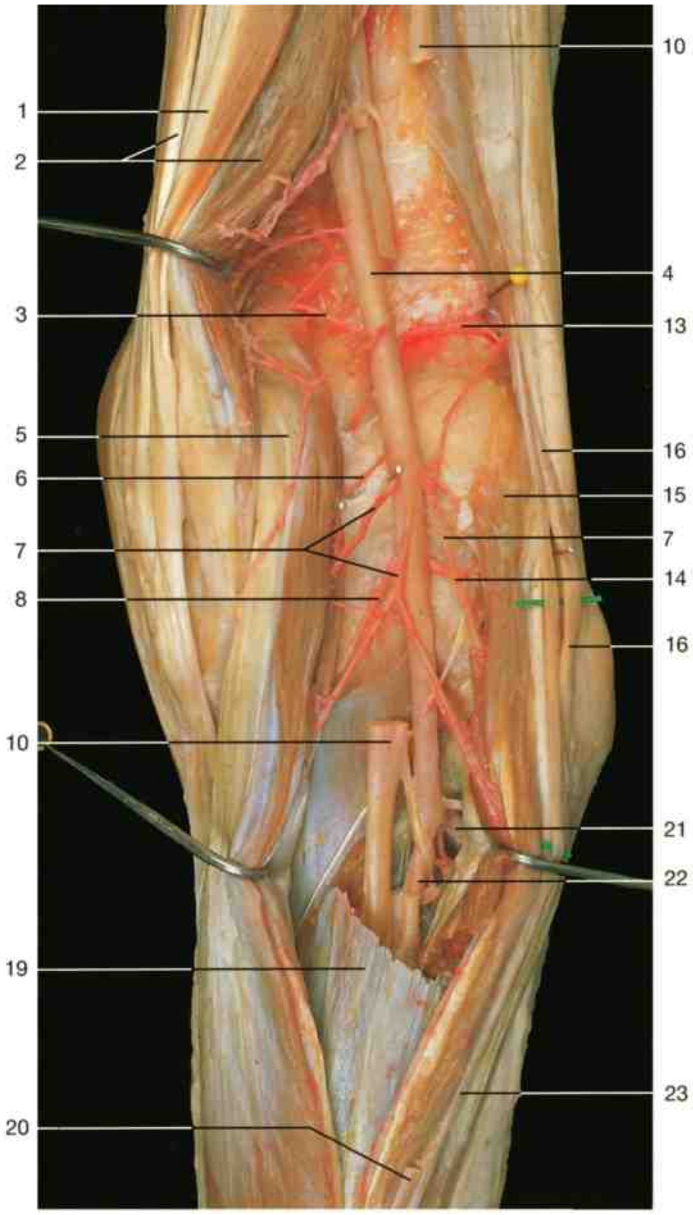


Right leg, popliteal fossa, deep layer (posterior aspect). The gastrocnemius and the soleus muscles have been divided and reflected.

1	Semitendinosus muscle
2	Gracilis muscle
3	Semimembranosus muscle
4	Sartorius muscle
5	Tendon of semitendinosus muscle
6	Position of medial condyle of femur
7	Muscular branches of tibial nerve
8	Sural arteries and veins
9	Tendon of semimembranosus muscle
10	Common tendon of gracilis, semitendinosus, and sartorius muscles
11	Medial head of gastrocnemius muscle
12	Biceps femoris muscle
13	Muscular branch of popliteal artery
14	Popliteal artery
15	Popliteal vein
16	Tibial nerve
17	Common peroneal nerve
18	Lateral head of gastrocnemius muscle
19	Medial sural cutaneous nerve
20	Medial superior genicular artery
21	Medial head of gastrocnemius muscle (cut and reflected)
22	Medial inferior genicular artery
23	Soleus muscle
24	Tendon of plantaris muscle
25	Lateral superior genicular artery
26	Lateral inferior genicular artery
27	Plantaris muscle

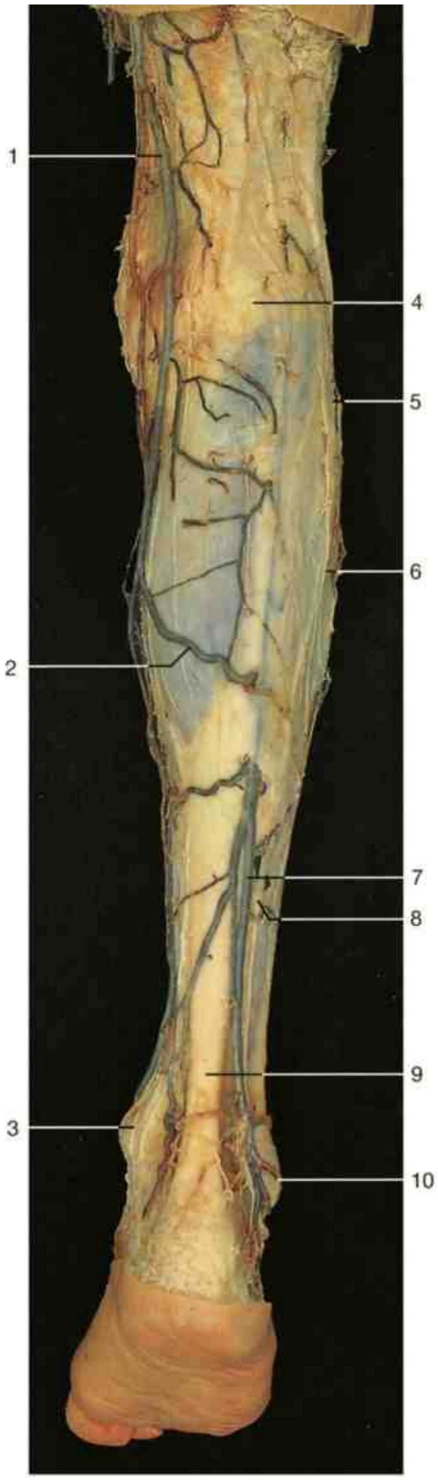


Right leg, popliteal fossa, deep layer (posterior aspect). The muscles have been reflected to display the genicular arteries.

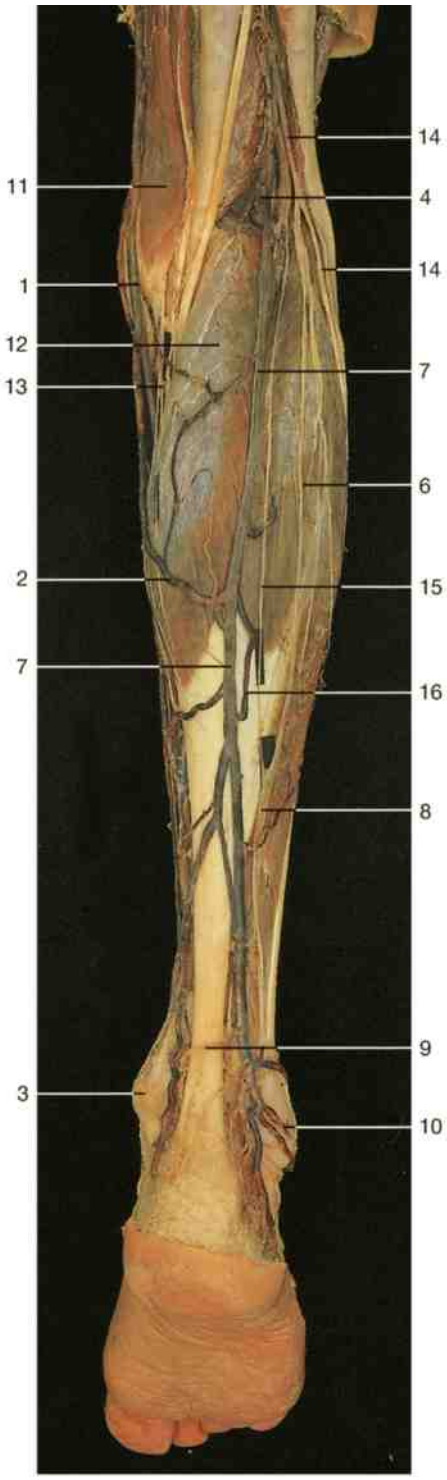


Right leg, popliteal fossa, deepest layer (posterior aspect). Tibial nerve and popliteal vein have been partly removed and a portion of the soleus muscle was cut away to display the anterior tibial artery.

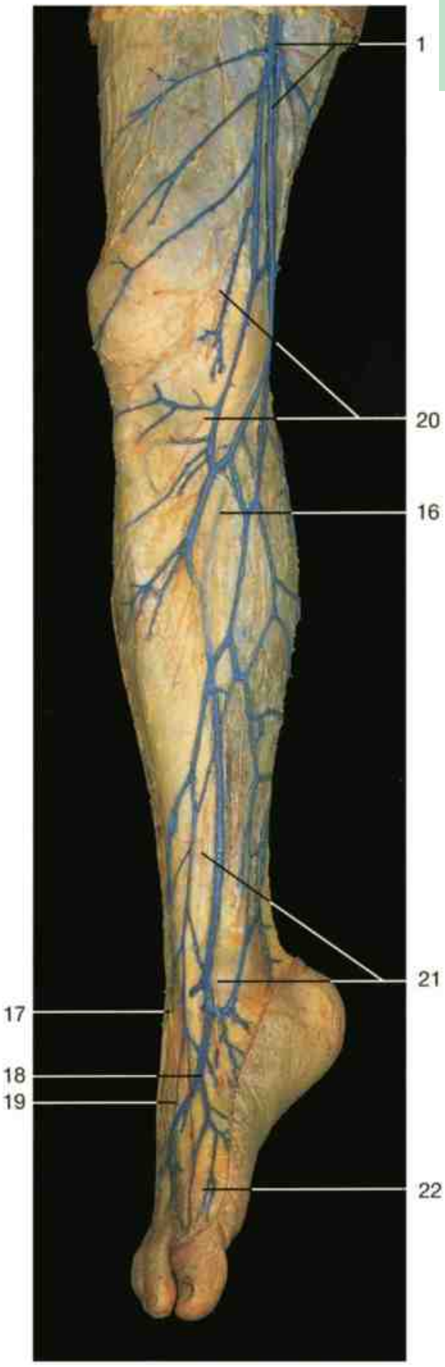
1 Semitendinosus muscle
2 Semimembranosus muscle
3 Medial superior genicular artery
4 Popliteal artery
5 Medial head of gastrocnemius muscle
6 Middle genicular artery
7 Muscular branches
8 Medial inferior genicular artery
9 Tendon of plantaris muscle
10 Tibial nerve (cut)
11 Biceps femoris muscle
12 Popliteal vein (cut)
13 Lateral superior genicular artery
14 Lateral inferior genicular artery
15 Lateral head of gastrocnemius muscle
16 Common peroneal nerve
17 Head of fibula
18 Lateral sural cutaneous nerves
19 Soleus muscle
20 Medial sural cutaneous nerve
21 Anterior tibial artery
22 Posterior tibial artery
23 Lateral sural cutaneous nerve



Right leg, cutaneous veins and nerves (posterior aspect).

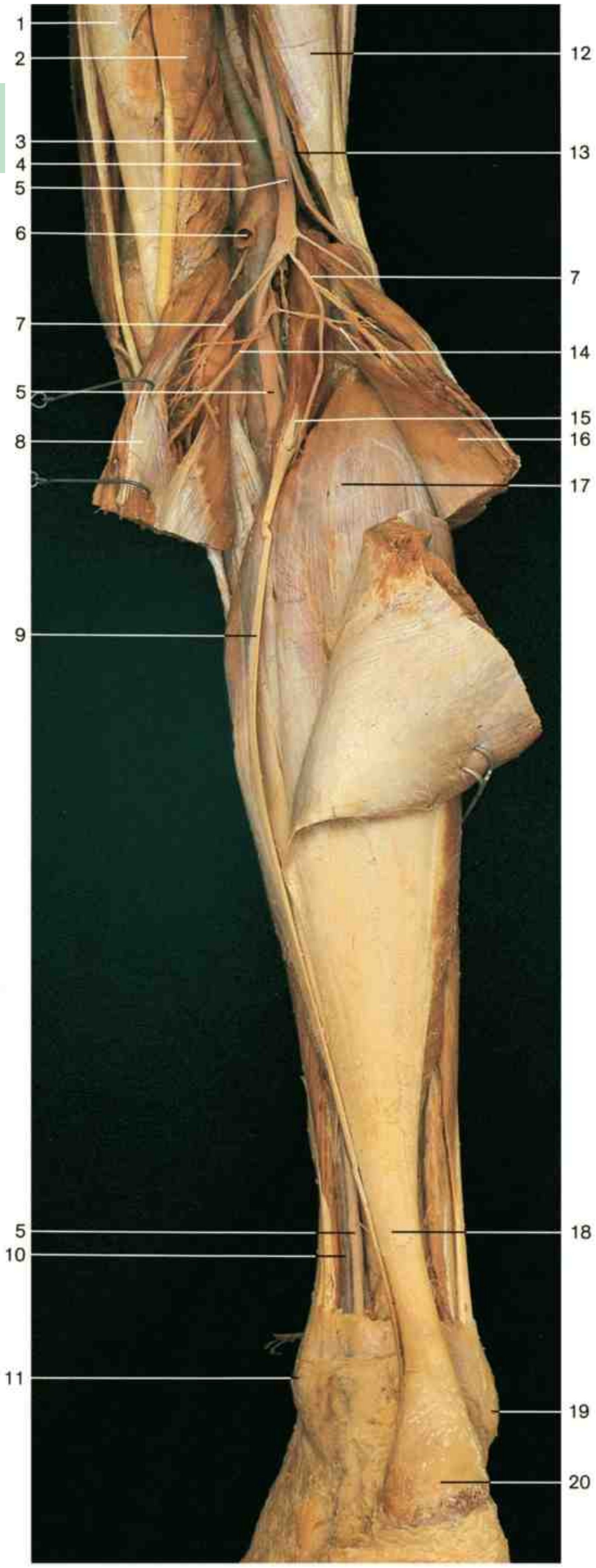


Right leg, cutaneous veins and nerves (posterior aspect).
The superficial layer of the crural fascia has been removed.



Right leg, cutaneous veins and nerves (antero-medial aspect).

1 Great saphenous vein
2 Venous anastomosis between small and great saphenous veins
3 Medial malleolus
4 Popliteal fossa
5 Position of head of fibula
6 Lateral sural cutaneous nerve
7 Small saphenous vein
8 Sural nerve
9 Calcaneal tendon
10 Lateral malleolus
11 Semitendinosus muscle
12 Medial head of gastrocnemius muscle
13 Saphenous nerve
14 Common peroneal nerve
15 Medial sural cutaneous nerve
16 Perforating veins
17 Superficial peroneal nerve
18 Dorsal venous arch
19 Intermediate dorsal cutaneous nerve
20 Infrapatellar branches of saphenous nerve
21 Terminal branches of saphenous nerve
22 Medial dorsal cutaneous nerve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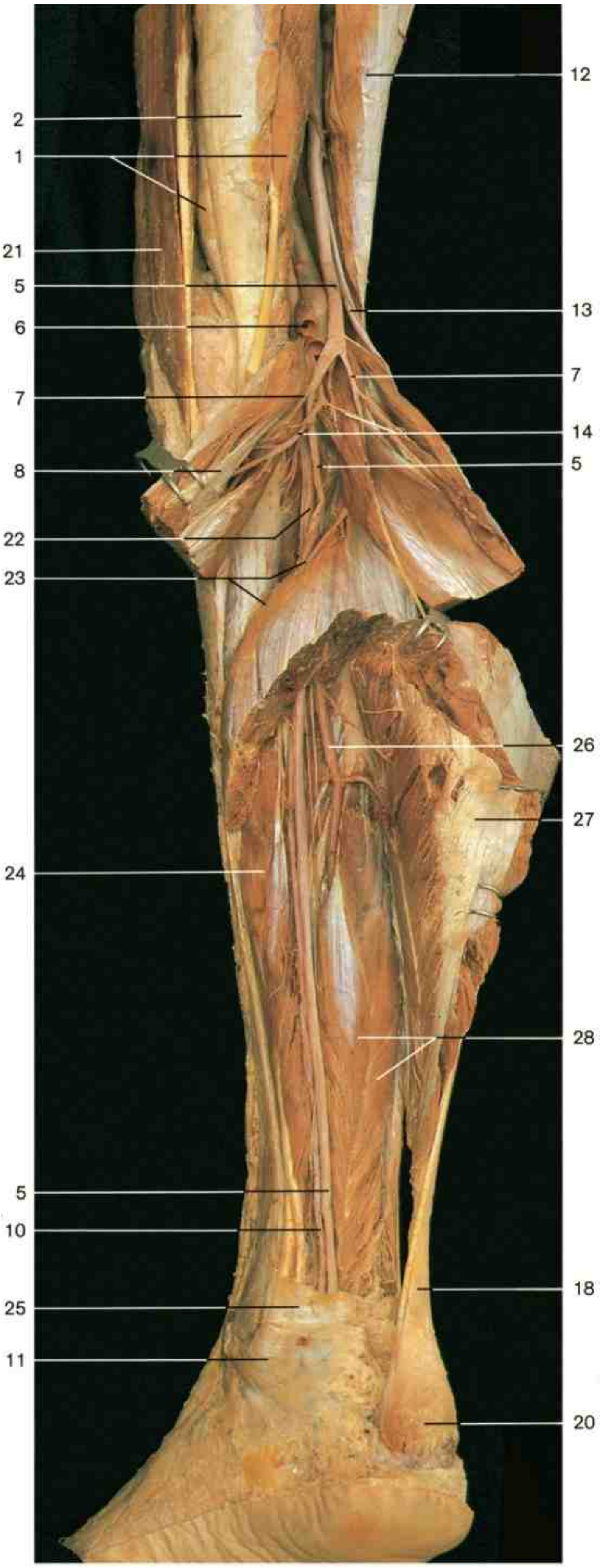
Right leg, posterior crural region, and popliteal fossa, middle layer (posterior aspect). The cutaneous veins and nerves have been removed.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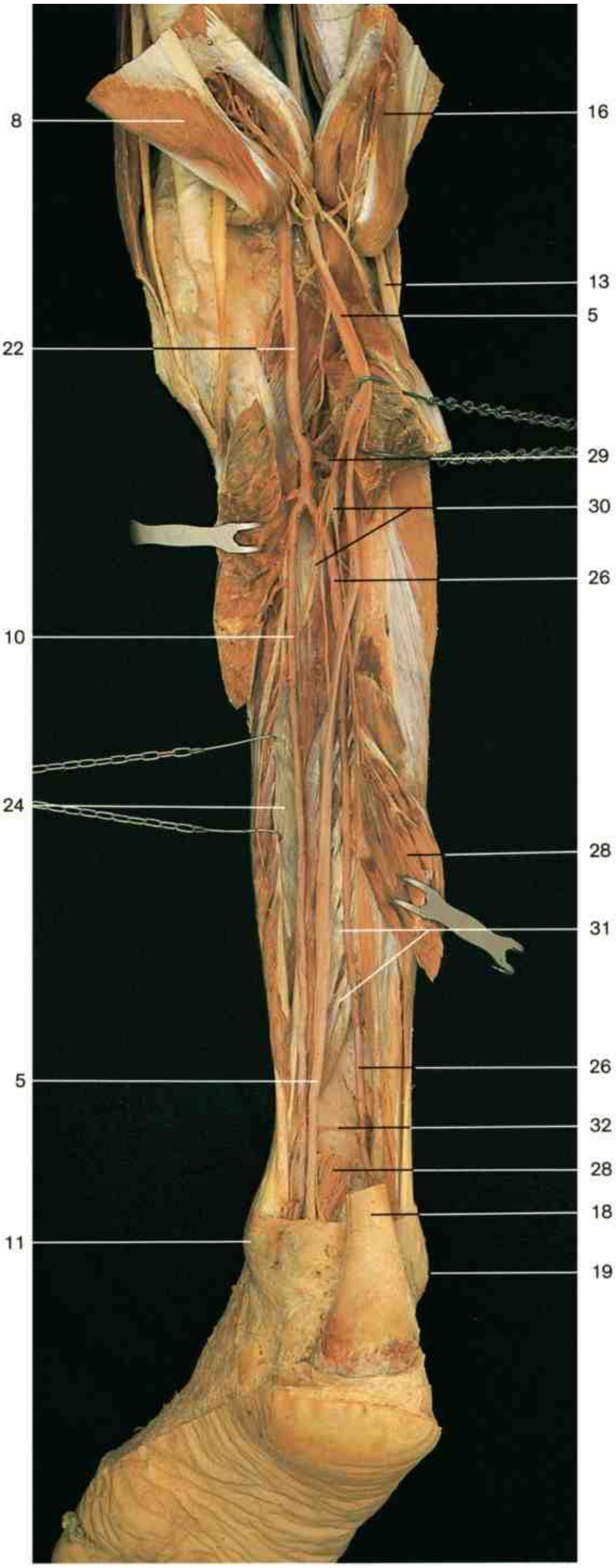
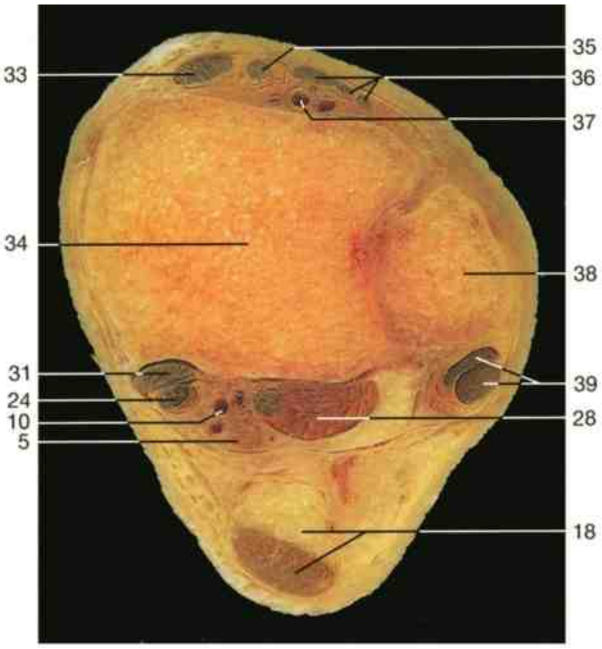
Right leg, posterior crural region, and popliteal fossa, deep layer (posterior aspect). The medial head of gastrocnemius muscle has been divided and reflected.

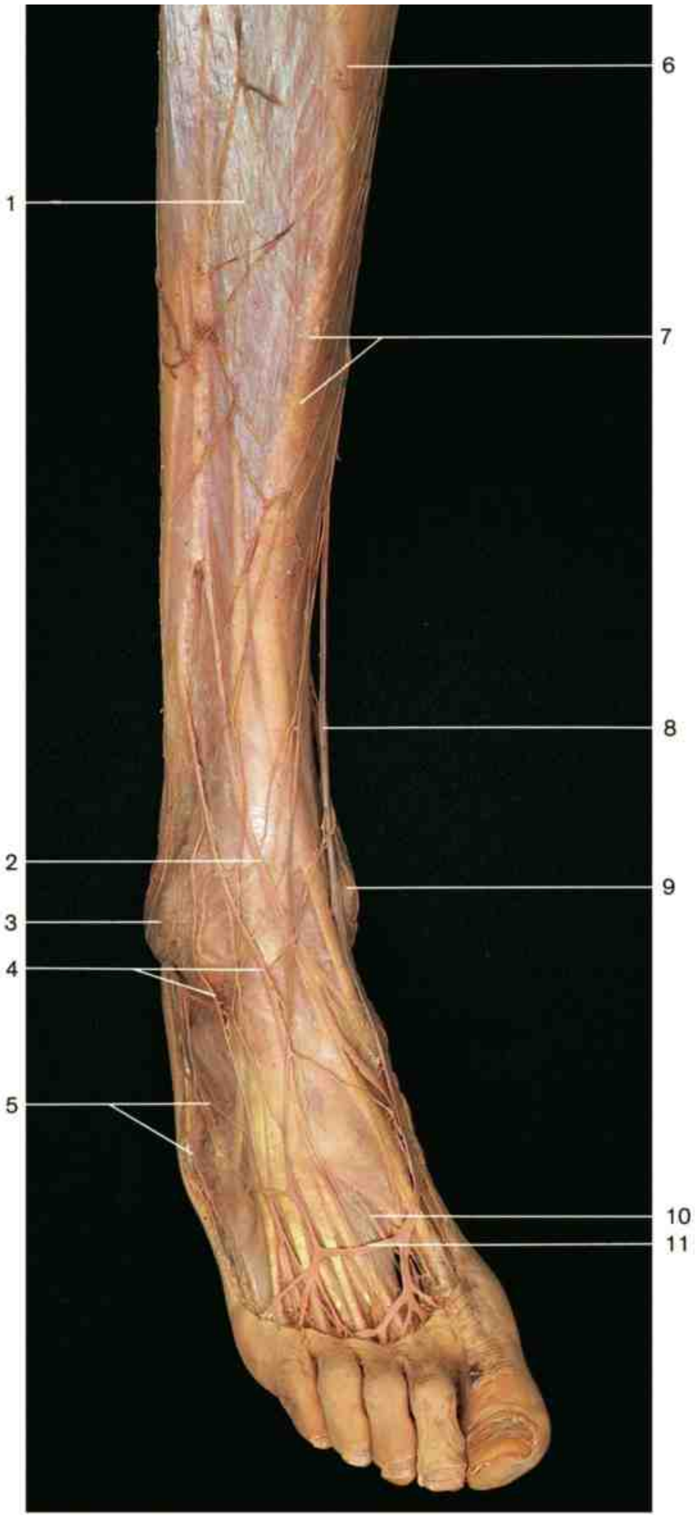


Right leg, posterior crural region, deepest layer (posterior aspect). Triceps surae (gastrocnemius and soleus) and flexor hallucis longus muscles have been cut and reflected.

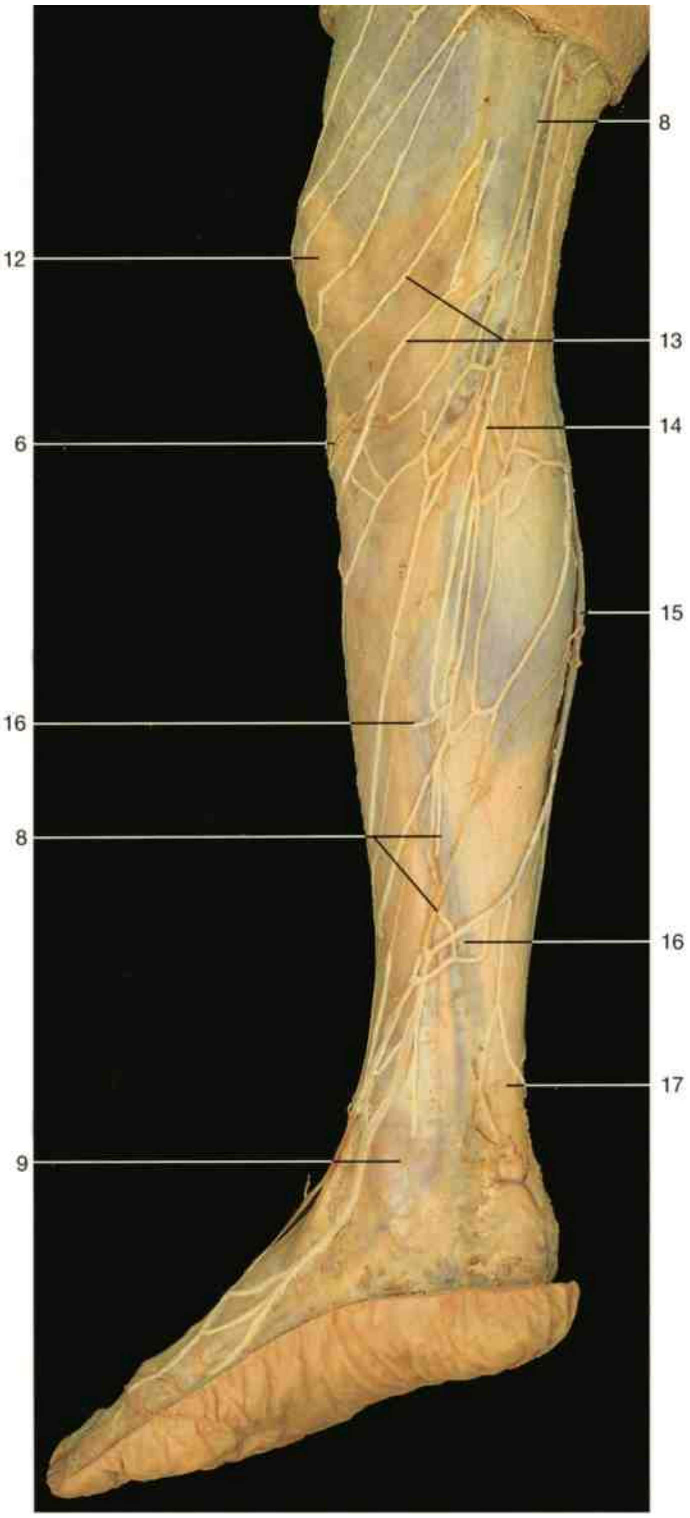
1 Semimembranosus muscle
2 Semitendinosus muscle
3 Popliteal vein
4 Popliteal artery
5 Tibial nerve
6 Small saphenous vein (cut)
7 Muscular branch of tibial nerve
8 Medial head of gastrocnemius muscle
9 Tendon of plantaris muscle
10 Posterior tibial artery
11 Medial malleolus
12 Biceps femoris muscle
13 Common peroneal nerve
14 Sural arteries
15 Plantaris muscle
16 Lateral head of gastrocnemius muscle
17 Soleus muscle
18 Calcaneal tendon
19 Lateral malleolus
20 Calcaneal tuberosity
21 Sartorius muscle
22 Popliteal artery
23 Tendinous arch of soleus muscle
24 Flexor digitorum longus muscle
25 Flexor retinaculum
26 Peroneal artery
27 Soleus muscle
28 Flexor hallucis longus muscle
29 Anterior tibial artery
30 Muscular branches of tibial nerve
31 Tibialis posterior muscle
32 Communicating branch of peroneal artery
33 Tendon of tibialis anterior muscle
34 Tibia
35 Tendon of extensor hallucis longus muscle
36 Tendons of extensor digitorum longus muscle
37 Anterior tibialis artery
38 Fibula
39 Tendons of peroneus longus and brevis muscles



Cross section of the leg, superior to the malleoli (from below).

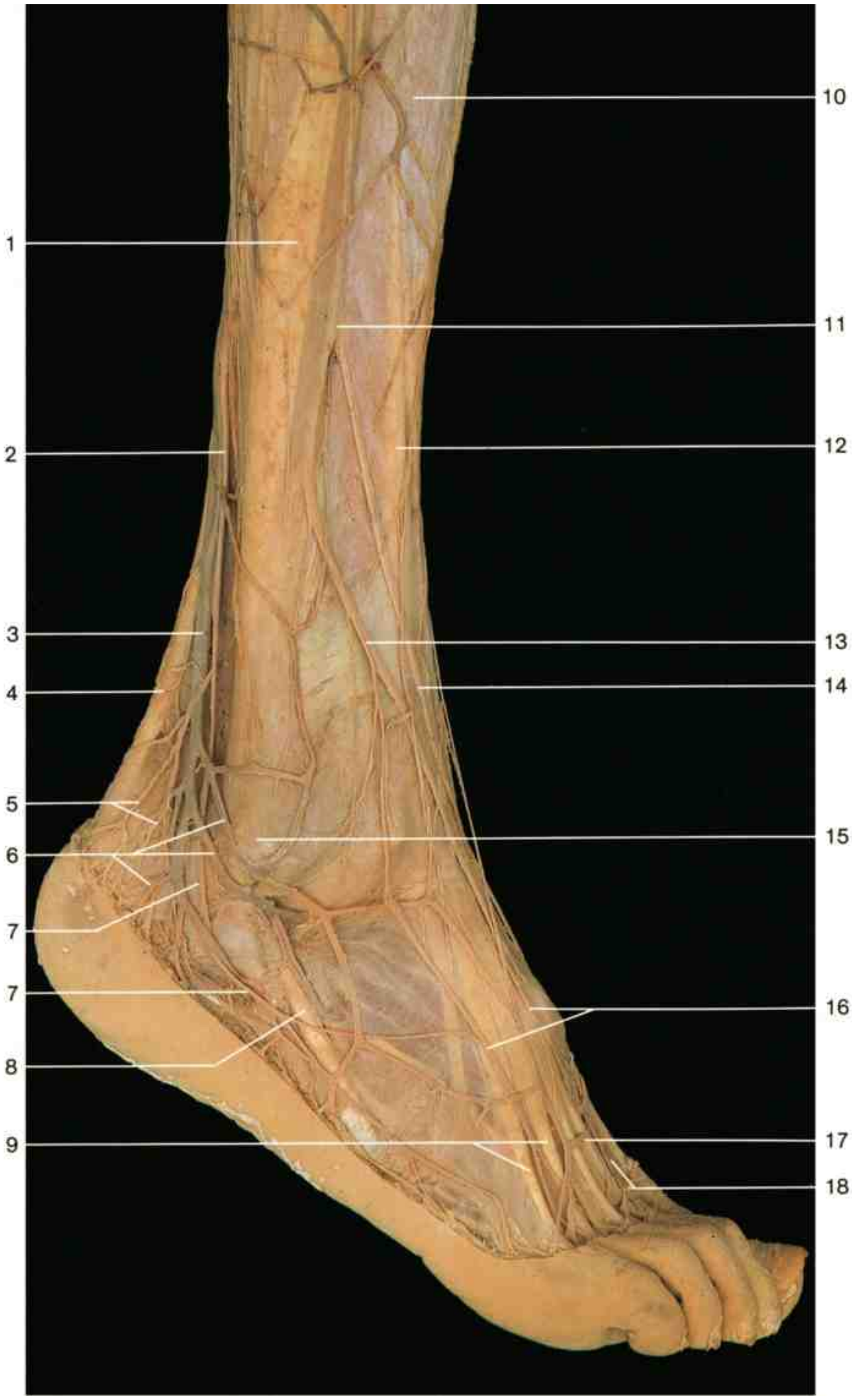


Right leg and foot, anterior crural region and dorsum of foot (anterior aspect). Cutaneous nerves and veins.

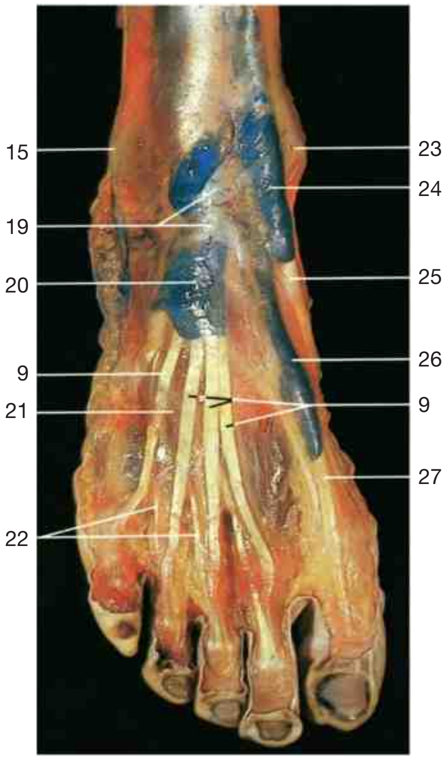


Right leg and foot (medial aspect). Cutaneous nerves and veins.

1 Superficial crural fascia
2 Medial cutaneous branch of superficial peroneal nerve
3 Lateral malleolus
4 Lateral cutaneous branch of superficial peroneal nerve
5 Cutaneous branch of sural nerve
6 Position of tuberosity of tibia
7 Anterior margin of tibia
8 Great saphenous vein
9 Medial malleolus
10 Deep peroneal nerve
11 Venous arch of dorsum of foot
12 Position of patella
13 Infrapatellar branches of saphenous nerve
14 Saphenous nerve
15 Small saphenous vein
16 Perforating vein
17 Calcaneal tendon

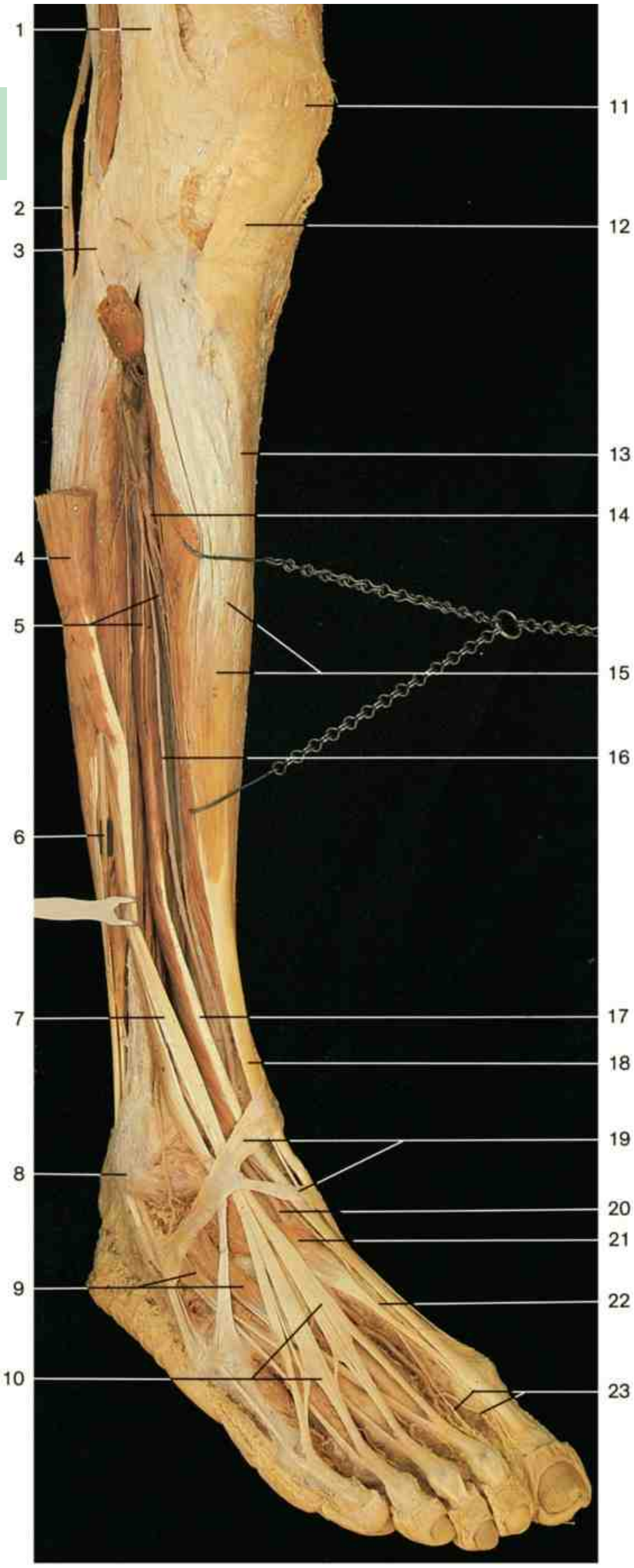


Right leg and foot (lateral aspect). Cutaneous nerves and veins.



Right foot with synovial sheaths of extensor muscles (dorsal aspect). The synovial sheaths have been injected with blue solution.

1 Position of fibula
2 Sural nerve
3 Small saphenous vein
4 Calcaneal tendon
5 Lateral calcaneal branches of sural nerve
6 Venous network at lateral malleolus
7 Cutaneous branch of sural nerve
8 Tendon of peroneus brevis muscle
9 Tendons of extensor digitorum longus muscle
10 Fascia cruris
11 Superficial peroneal nerve
12 Position of tibia
13 Lateral cutaneous branch } of superficial
14 Medial cutaneous branch } peroneal nerve
15 Lateral malleolus
16 Dorsal digital nerves
17 Dorsal venous arch
18 Deep peroneal nerve
19 Inferior extensor retinaculum
20 Common synovial sheath of extensor digitorum longus muscle
21 Extensor digitorum brevis muscle
22 Tendons of extensor digitorum brevis muscle
23 Medial malleolus
24 Synovial sheath of tendon of tibialis anterior muscle
25 Tendon of tibialis anterior muscle
26 Synovial sheath of tendon of extensor hallucis longus muscle
27 Tendon of extensor hallucis longus muscle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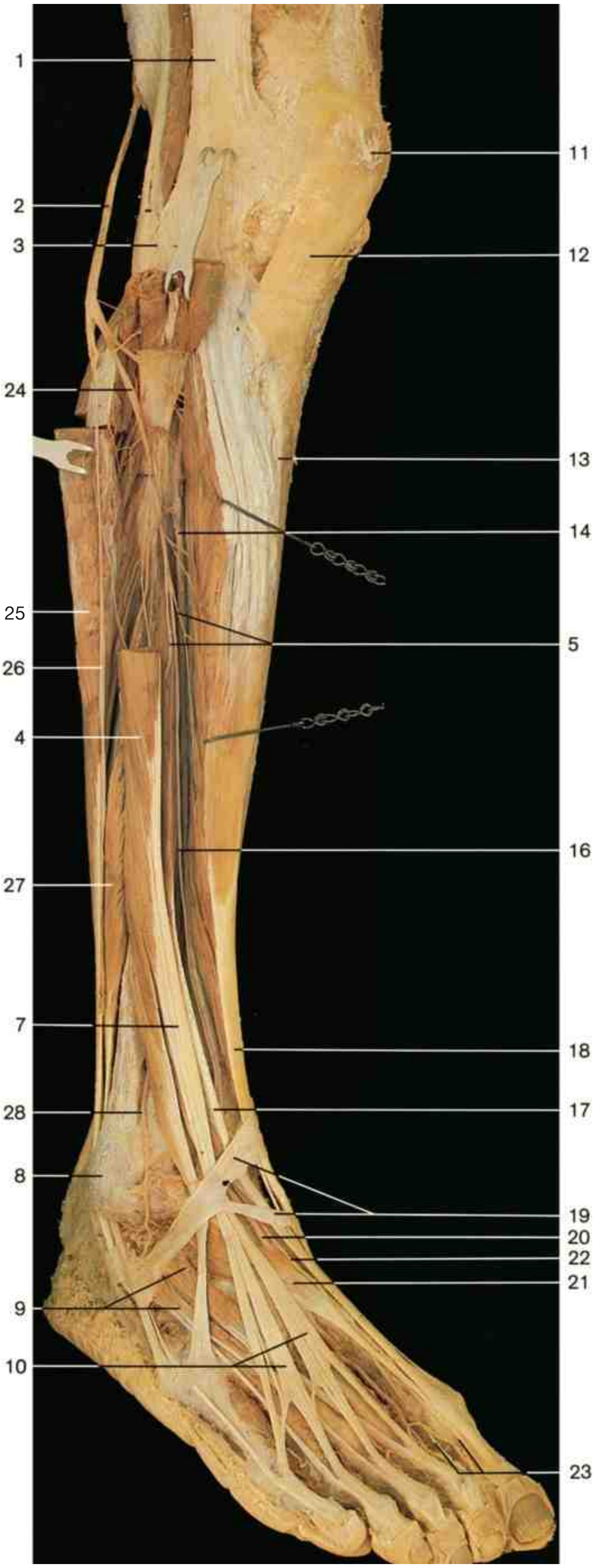
Right leg and foot, anterior crural region and dorsum of foot, middle layer (antero-lateral aspect). The extensor digitorum longus muscle has been divided and reflected laterally.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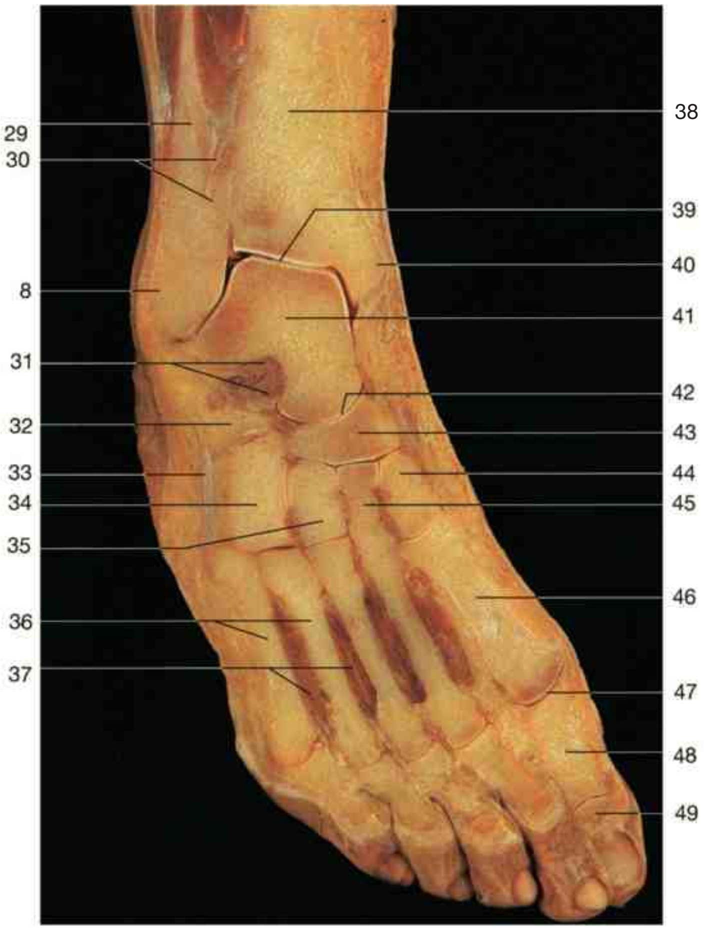
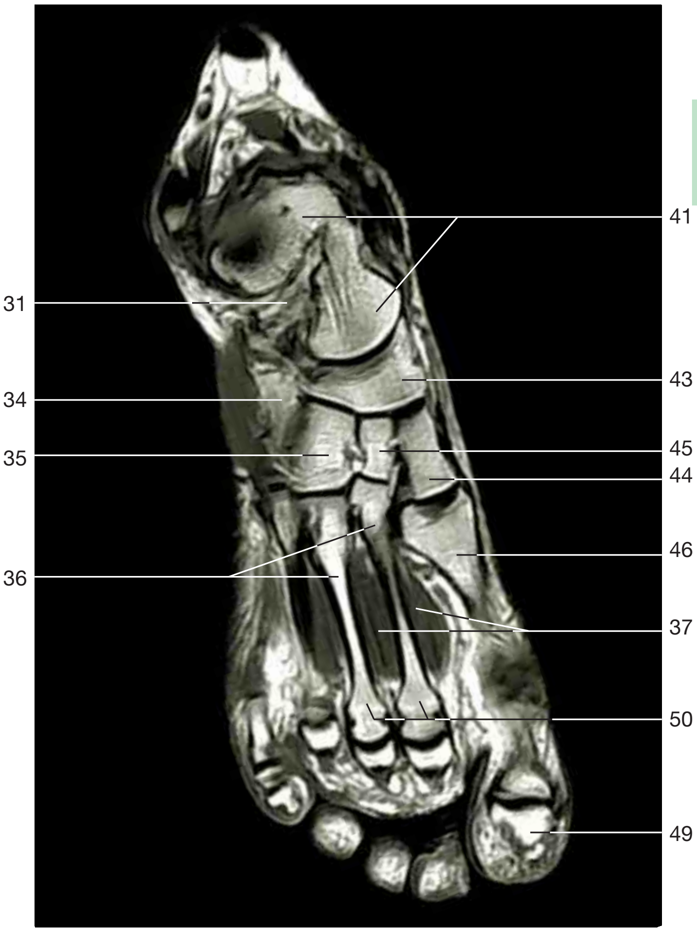
Right leg and foot, anterior crural region and dorsum of foot, deep layer (antero-lateral aspect). The extensor digitorum longus and peroneus longus muscles have been divided or removed. The common peroneal nerve has been elevated to show its course around the head of fibula.

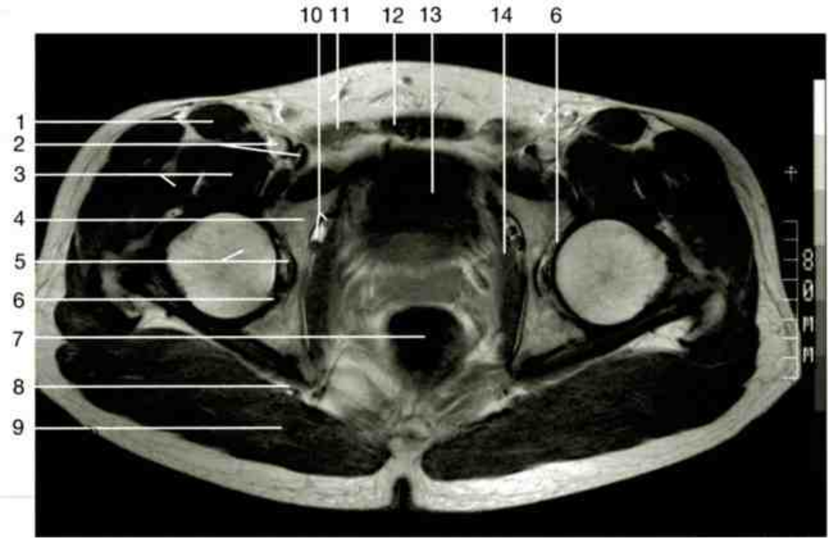


Coronal section through the foot and ankle joint (anterior aspect).



Coronal section through the foot and ankle joint (MRI scan; from Heuck et al., MRT-Atlas, 2009).

1 Iliotibial tract
2 Common peroneal nerve
3 Position of head of fibula
4 Extensor digitorum longus muscle
5 Muscular branches of deep peroneal nerve
6 Superficial peroneal nerve
7 Tendon of extensor digitorum longus muscle
8 Lateral malleolus
9 Extensor digitorum brevis muscle
10 Tendons of extensor digitorum longus muscle
11 Patella
12 Patellar ligament
13 Anterior margin of tibia
14 Anterior tibial artery
15 Tibialis anterior muscle
16 Deep peroneal nerve
17 Extensor hallucis longus muscle
18 Tendon of tibialis anterior muscle
19 Extensor retinaculum
20 Dorsalis pedis artery
21 Extensor hallucis brevis muscle
22 Deep peroneal nerve (on dorsum of foot)
23 Dorsal digital nerves (terminal branches of deep peroneal nerve)
24 Deep peroneal nerve
25 Peroneus longus muscle (cut)
26 Superficial peroneal nerve (with peroneal muscles laterally reflected)
27 Peroneus brevis muscle
28 Lateral anterior malleolar artery
29 Fibula
30 Distal tibiofibular joint (syndesmosis)
31 Talocalcaneal interosseous ligament
32 Calcaneus
33 Tendon of peroneus brevis muscle
34 Cuboid bone
35 Lateral cuneiform bone
36 Metatarsal bones
37 Dorsal interosseous muscles
38 Tibia
39 Ankle joint
40 Medial malleolus
41 Talus
42 Talocalcaneonavicular joint
43 Navicular bone
44 Medial cuneiform bone
45 Intermediate cuneiform bone
46 First metatarsal bone
47 Metatarsophalangeal joint of great toe
48 Proximal phalanx of great toe
49 Distal phalanx of great toe
50 Heads of metatarsal bones II–III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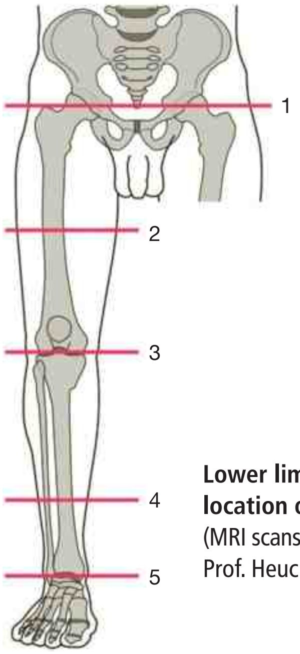
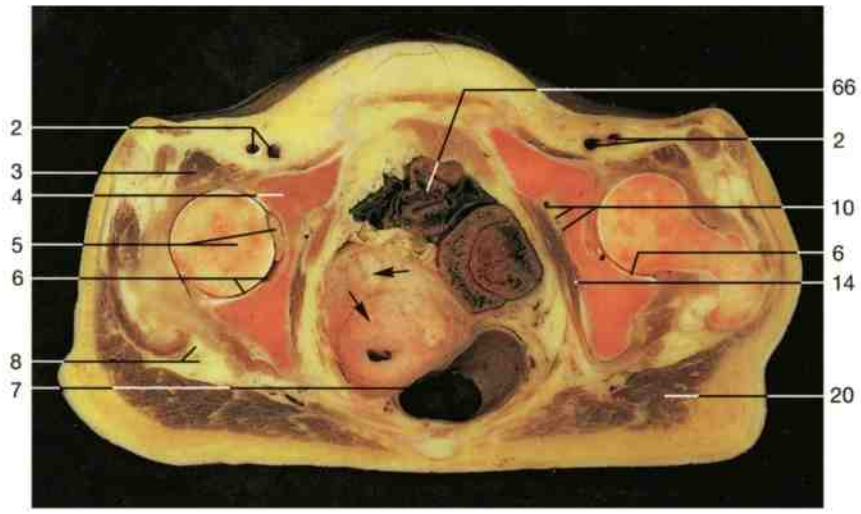
Axial section through the pelvis and the hip joints
(section 1; MRI scan; inferior aspect).



Lower limb,
location of sections 1–5
(MRI scans, courtesy of
Prof. Heuck, Munich, Germany).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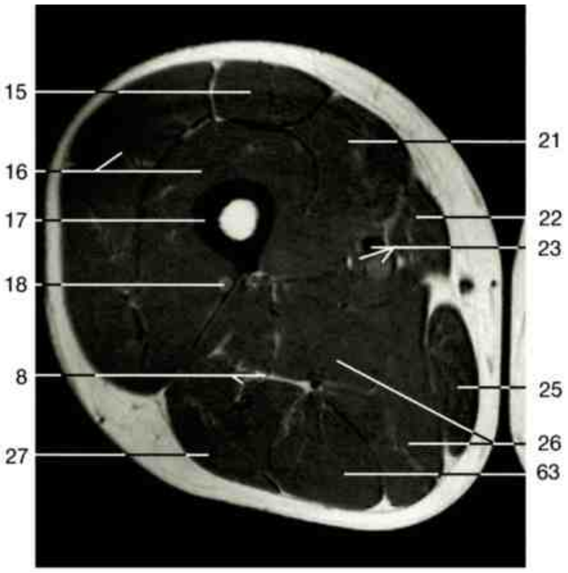
Axial section through the pelvis and the hip joints in the female
(section 1; inferior aspect). Arrows: uterus, myometrium with myoma.

1	Sartorius muscle
2	Femoral artery and vein
3	Iliopsoas muscle
4	Pubis (os pubis)
5	Femoral head with ligament of femoral head
6	Articular cavity
7	Rectum
8	Sciatic nerve and accompanying artery
9	Gluteus maximus muscle
10	Obturator vessels and obturator nerve
11	Rectus abdominis muscle
12	Pyramidalis muscle
13	Urinary bladder
14	Obturator internus muscle
15	Rectus femoris muscle
16	Vastus intermedius and vastus lateralis of quadriceps femoris muscle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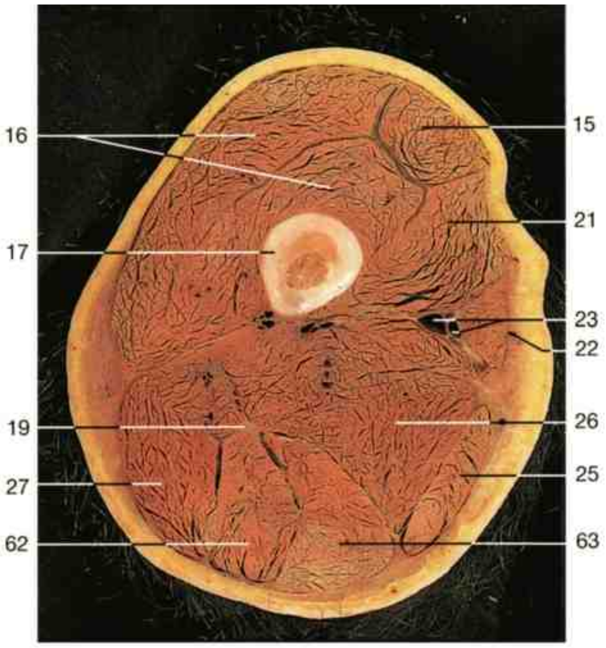
Axial section through the middle of the right thigh (section 2; MRI scan; inferior aspect).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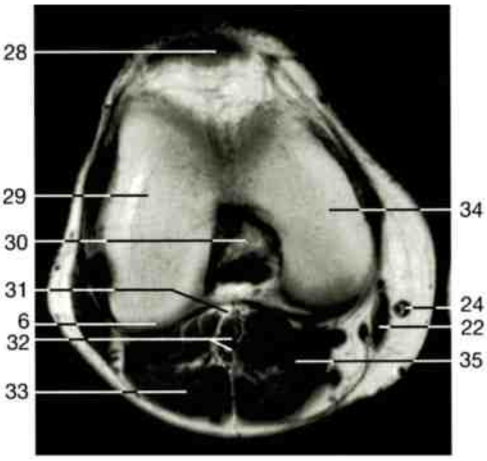
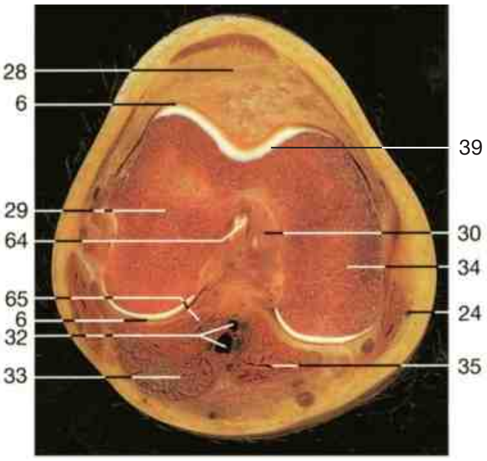
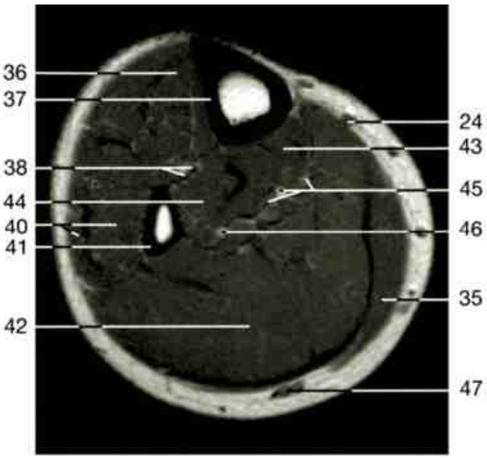
Axial section through the middle of the right thigh (section 2; inferior aspect).



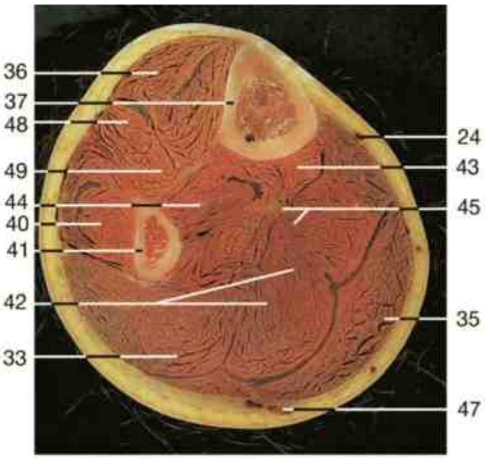
Axial section through the right knee joint (section 3; MRI scan; inferior aspect).



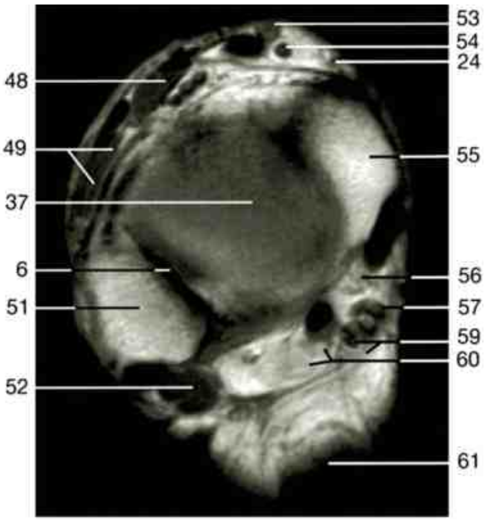
Axial section through the right knee joint (section 3; inferior aspect).



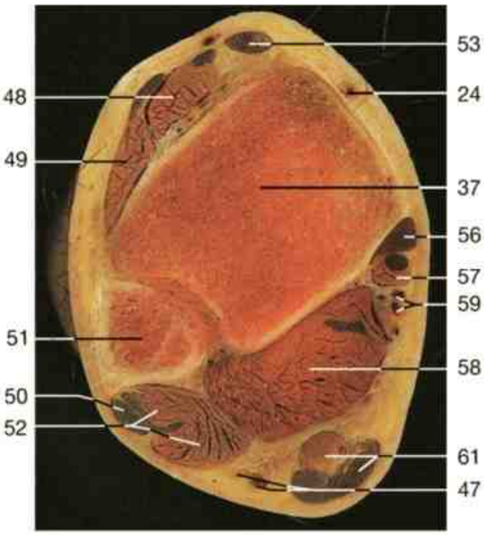
Axial section through the middle of the right leg (section 4; MRI scan; inferior aspect).



Axial section through the middle of the right leg (section 4; inferior aspect).

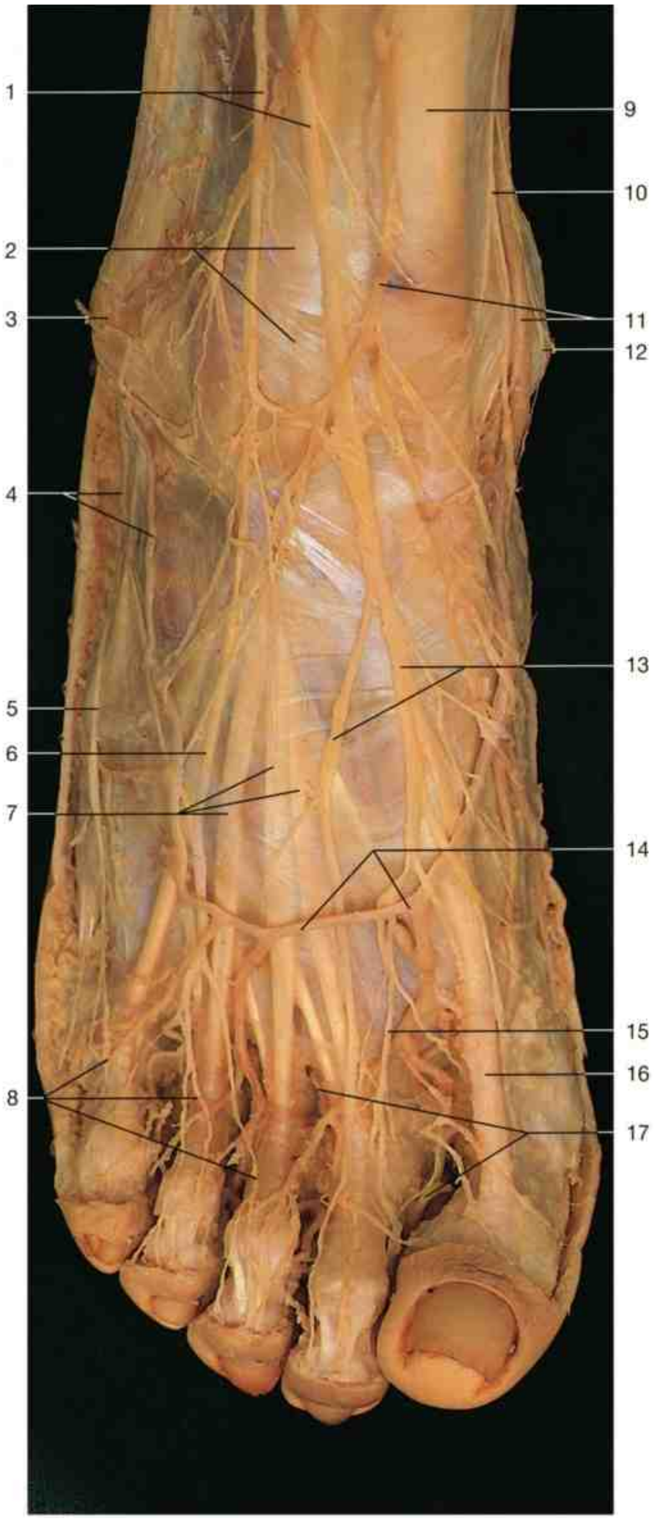


Axial section through the end of the right leg (section 5; MRI scan; inferior aspect).

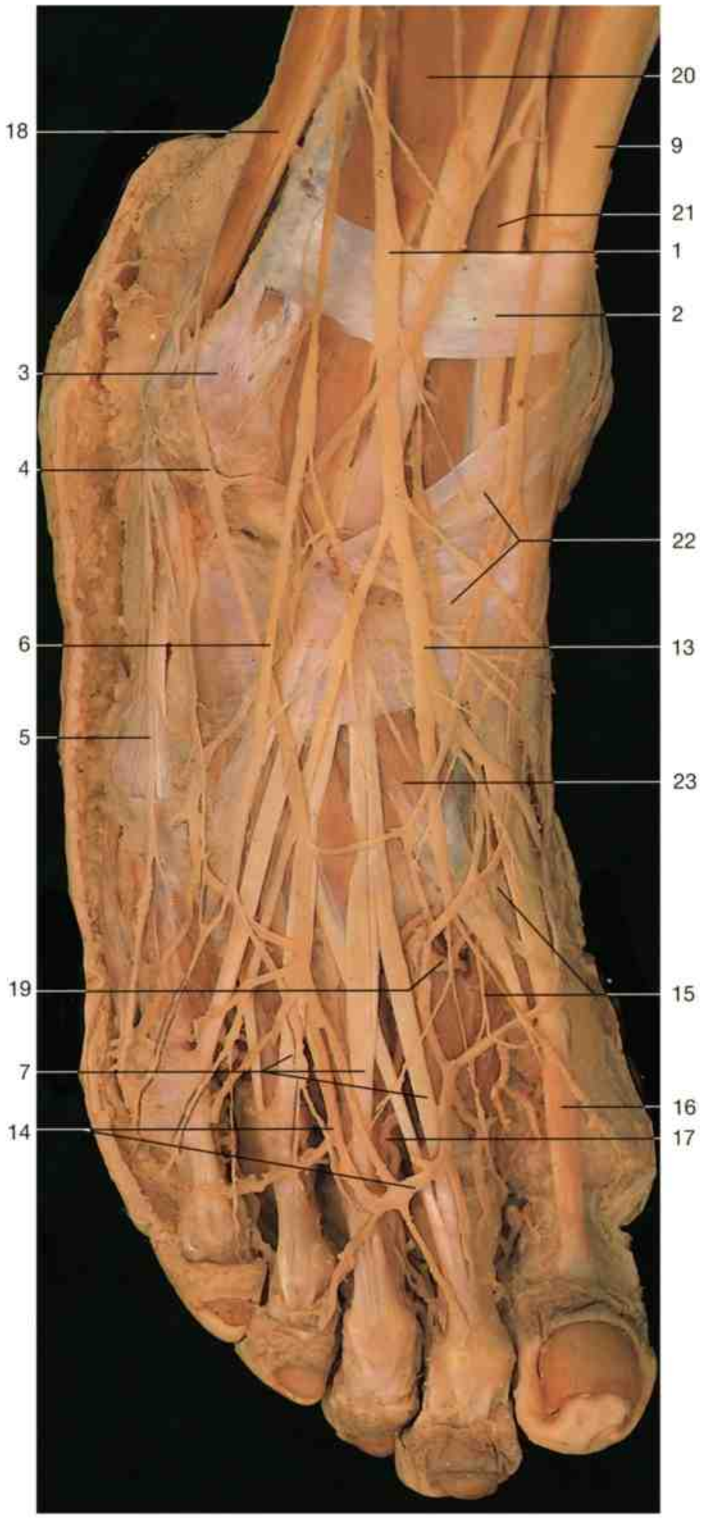


Axial section through the end of the right leg (section 5; inferior aspect).

17	Femur
18	Perforating artery
19	Sciatic nerve
20	Gluteus maximus muscle (insertion)
21	Vastus medialis muscle
22	Sartorius muscle
23	Femoral artery and vein
24	Great saphenous vein
25	Gracilis muscle
26	Adductor muscles
27	Biceps femoris muscle
28	Patellar ligament
29	Lateral condyle of femur
30	Posterior cruciate ligament
31	Tibial nerve
32	Popliteal artery and vein
33	Lateral head of gastrocnemius muscle
34	Medial condyle of femur
35	Medial head of gastrocnemius muscle
36	Tibialis anterior muscle
37	Tibia
38	Deep peroneal nerve, anterior tibial artery, and vein
39	Patellar surface
40	Peroneus longus and brevis muscles
41	Fibula
42	Soleus muscle
43	Flexor digitorum longus muscle
44	Tibialis posterior muscle
45	Posterior tibial artery and vein and tibial nerve
46	Peroneal artery
47	Small saphenous vein and sural nerve
48	Extensor hallucis longus muscle
49	Extensor digitorum longus muscle
50	Tendon of peroneus longus muscle
51	Lateral malleolus (fibula)
52	Peroneus brevis muscle
53	Tibialis anterior muscle (tendon)
54	Dorsalis pedis artery
55	Medial malleolus (tibia)
56	Tibialis posterior muscle (tendon)
57	Flexor digitorum longus muscle (tendon with synovial sheath)
58	Flexor hallucis longus muscle
59	Posterior tibial artery and vein
60	Lateral and medial plantar nerves
61	Calcaneal tendon
62	Semitendinosus muscle
63	Semimembranosus muscle
64	Anterior cruciate ligament
65	Plantaris muscle
66	Small intestine

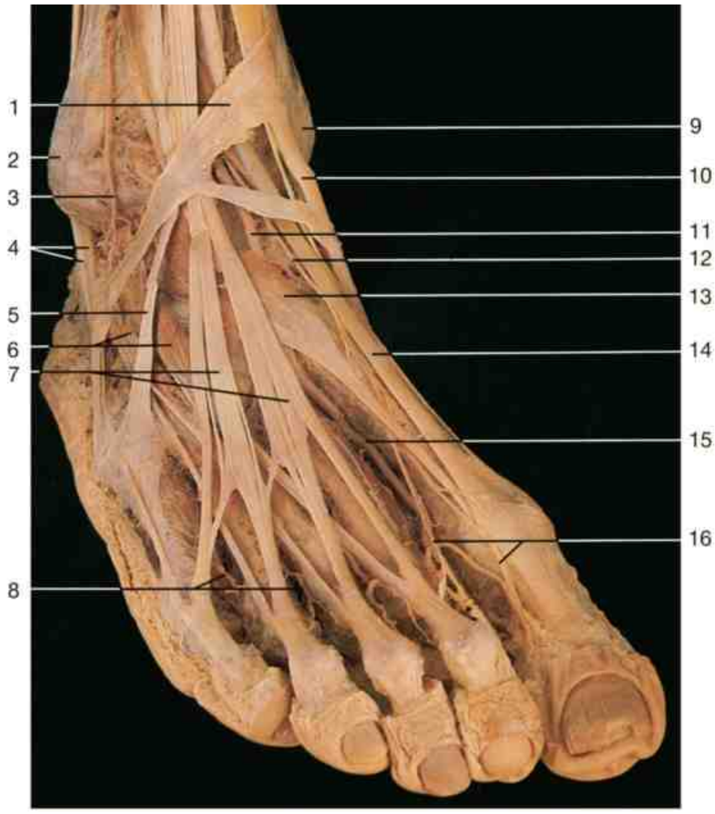


Dorsum of the right foot, superficial layer (anterior aspect).



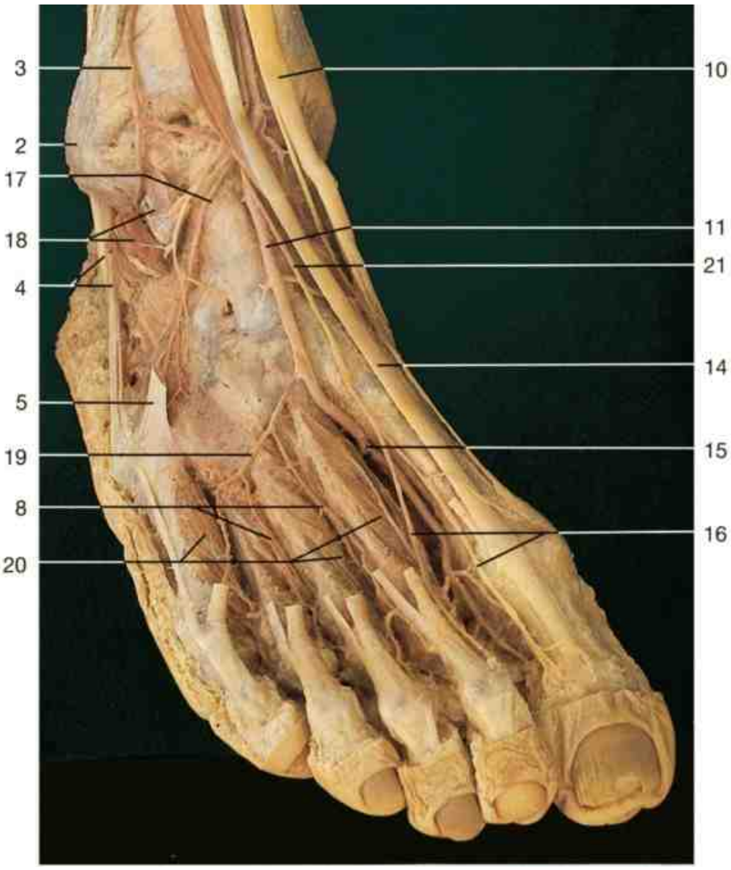
Dorsum of the right foot, superficial layer (anterior aspect). The fascia of the dorsum has been removed.

1 Superficial peroneal nerve
2 Superior extensor retinaculum
3 Lateral malleolus
4 Venous network of lateral malleolus and tributaries of small saphenous vein
5 Lateral dorsal cutaneous nerve (branch of sural nerve)
6 Intermediate dorsal cutaneous nerve
7 Tendons of extensor digitorum longus muscle
8 Dorsal digital nerves
9 Tendon of tibialis anterior muscle
10 Saphenous nerve
11 Venous network of medial malleolus and tributaries of great saphenous vein
12 Medial malleolus
13 Medial dorsal cutaneous nerves
14 Dorsal venous arch
15 Dorsal digital nerve (of deep peroneal nerve)
16 Tendon of extensor hallucis longus muscle
17 Dorsal digital arteries
18 Peroneal muscles
19 Deep plantar branch of dorsalis pedis artery anastomosing with plantar arch
20 Extensor digitorum longus muscle
21 Extensor hallucis longus muscle
22 Inferior extensor retinaculum
23 Extensor hallucis brevis muscle

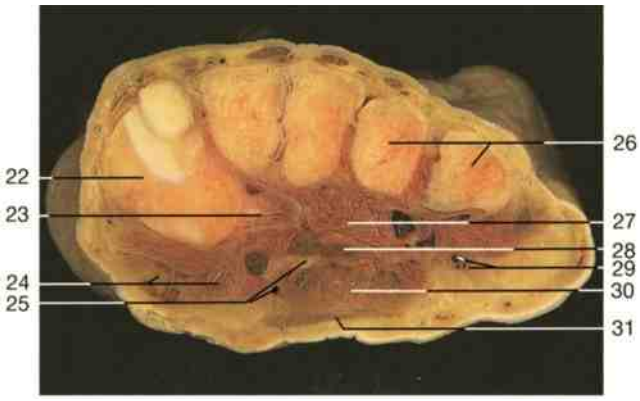


Dorsum of the right foot, middle layer (antero-lateral aspect). The cutaneous nerves have been removed.

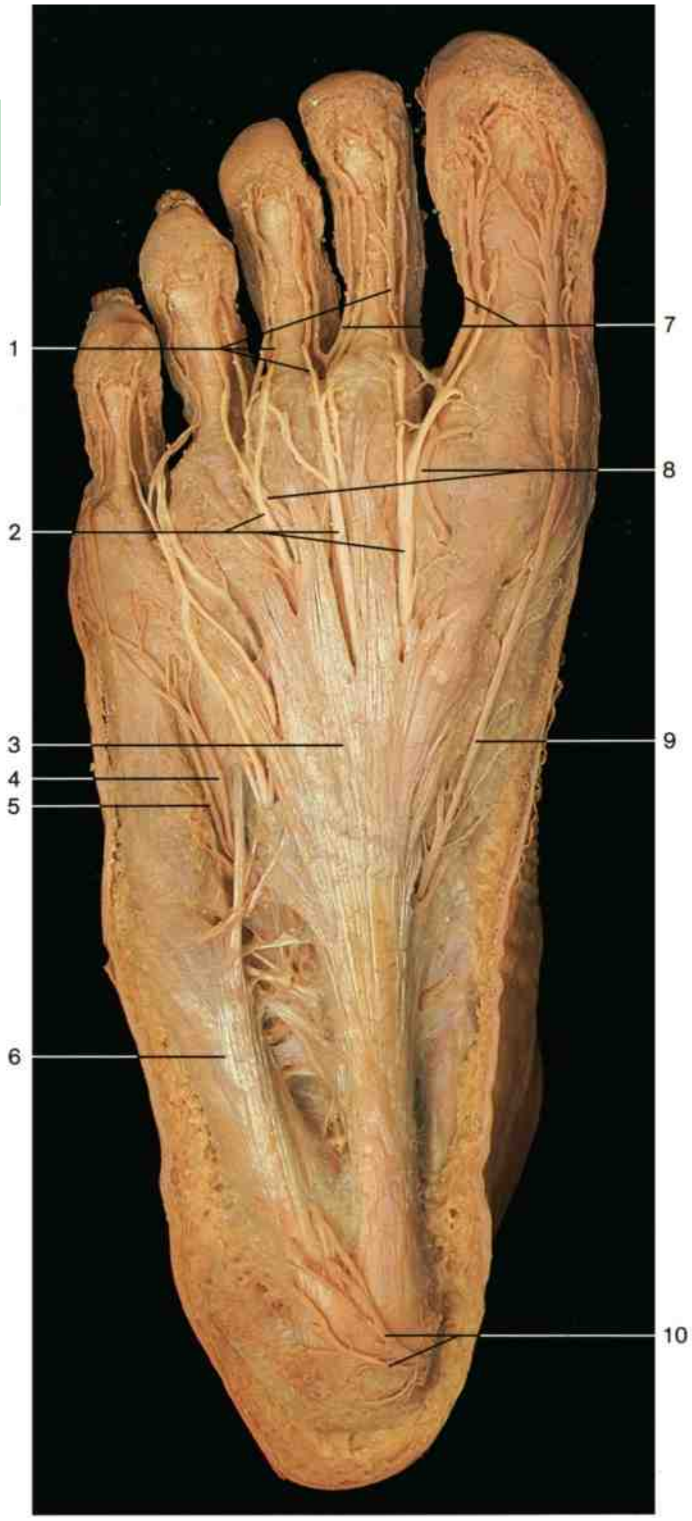
1	Extensor retinaculum
2	Lateral malleolus
3	Lateral anterior malleolar artery
4	Tendons of peroneal muscles
5	Tendon of peroneus tertius muscle
6	Extensor digitorum brevis muscle
7	Tendons of extensor digitorum longus muscle
8	Dorsal metatarsal arteries
9	Medial malleolus
10	Tendon of tibialis anterior muscle
11	Dorsalis pedis artery
12	Deep peroneal nerve (on dorsum of foot)
13	Extensor hallucis brevis muscle
14	Tendon of extensor hallucis longus muscle
15	Dorsalis pedis artery with deep plantar branch to the plantar arch
16	Dorsal digital nerves (terminal branches of deep peroneal nerve)
17	Lateral tarsal artery
18	Extensor digitorum brevis muscle (divided)
19	Arcuate artery
20	Dorsal interosseous muscles
21	Deep peroneal nerve
22	Medial cuneiform and first metatarsal bone
23	Tendon of peroneus longus muscle
24	Abductor hallucis and flexor hallucis brevis muscles
25	Medial plantar artery, vein, and nerve
26	Fourth and fifth metatarsal bone
27	Adductor hallucis muscle (oblique head)
28	Tendons of flexor digitorum longus muscle
29	Lateral plantar artery, vein, and nerve
30	Flexor digitorum brevis muscle
31	Plantar aponeurosis



Dorsum of the right foot, deep layer (antero-lateral aspect). The extensor digitorum and hallucis brevis muscles have been removed.



Cross section of the right foot at the level of the metatarsal bones (posterior aspect).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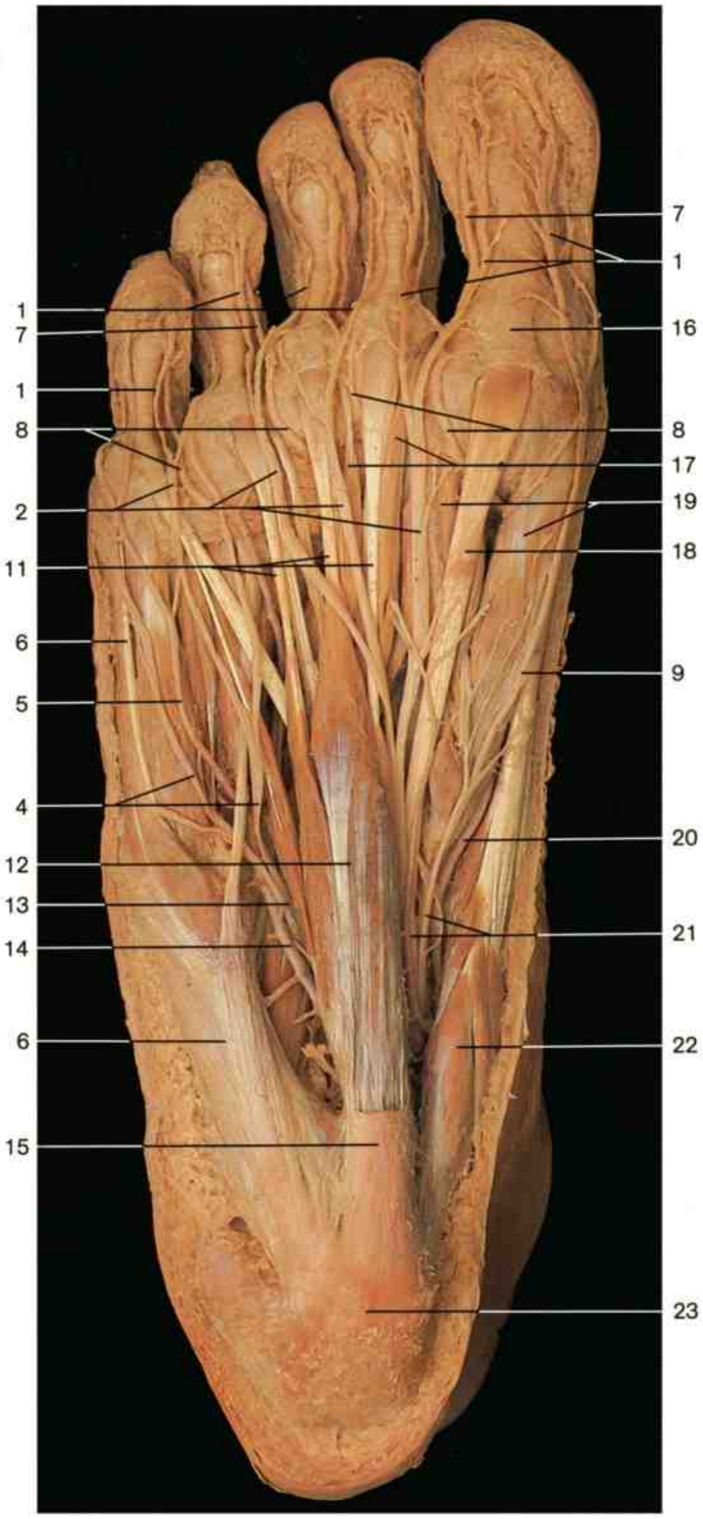
Sole of the right foot, superficial layer (from below). Dissection of cutaneous nerves and vessels.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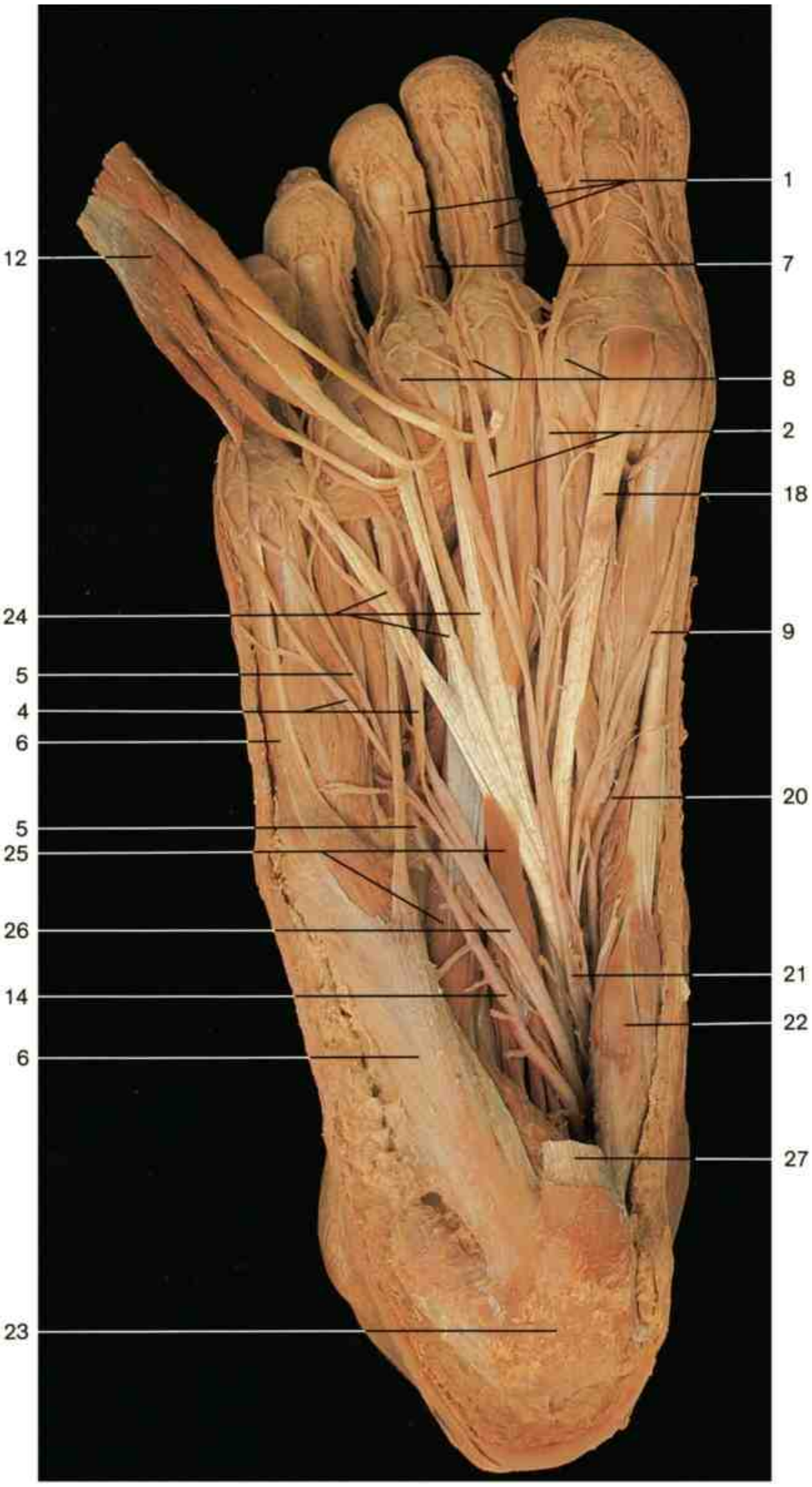
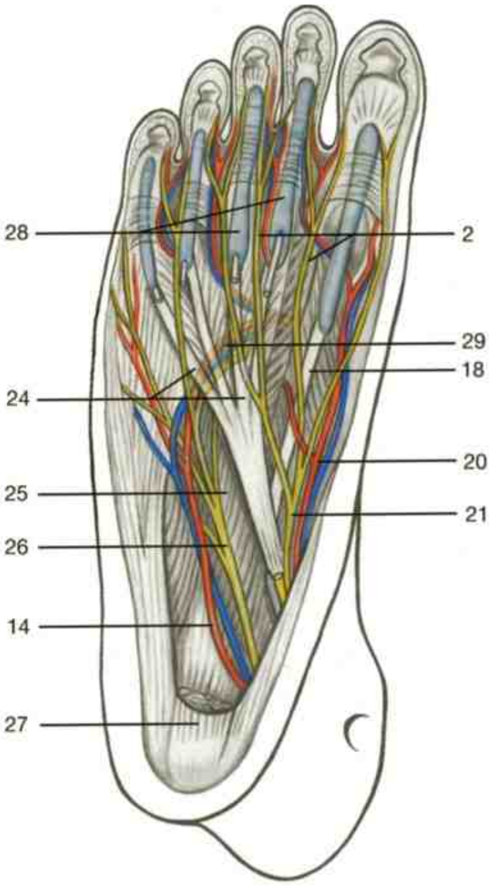
Sole of the right foot, middle layer (from below). The plantar aponeurosis has been removed.

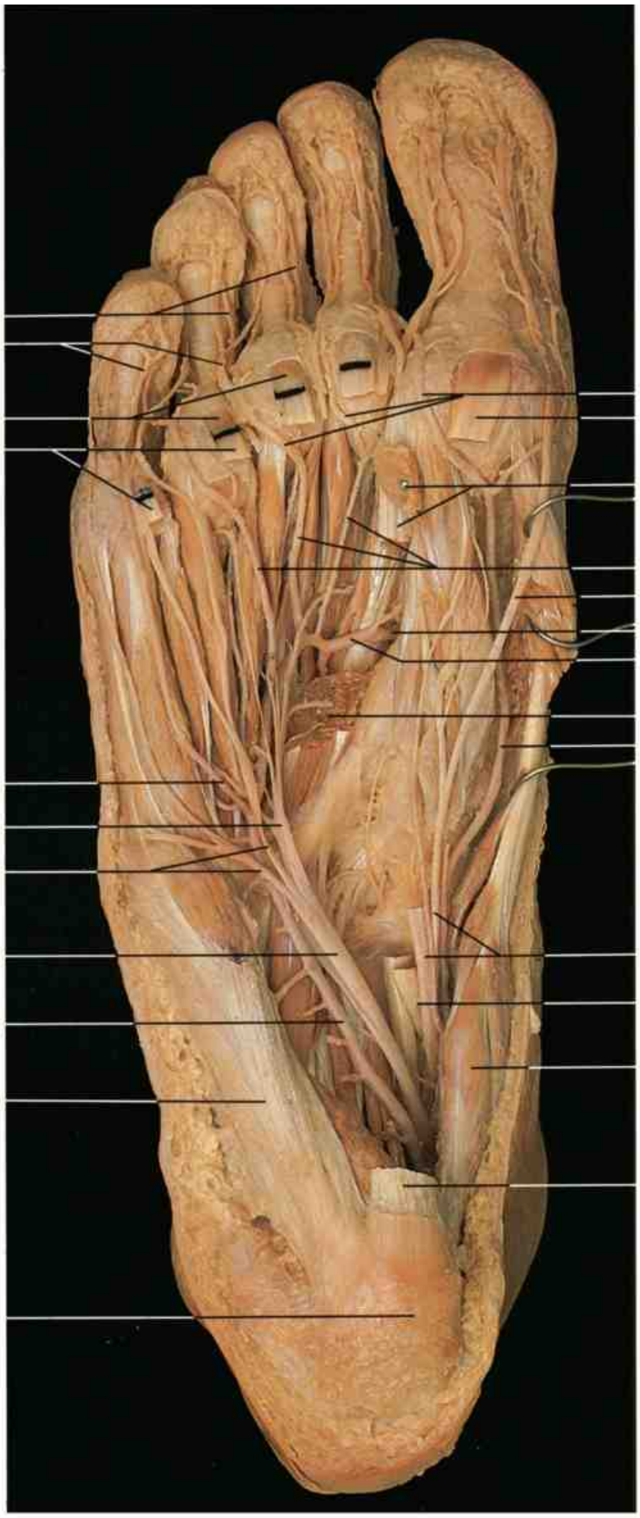
1 Proper plantar digital nerves
2 Common plantar digital nerves
3 Plantar aponeurosis
4 Superficial branch of lateral plantar nerve
5 Superficial branch of lateral plantar artery
6 Abductor digiti minimi
7 Proper plantar digital arteries
8 Common plantar digital arteries
9 Digital branch of medial plantar nerve to great toe
10 Medial calcaneal branches
11 Tendons of flexor digitorum brevis muscle
12 Flexor digitorum brevis muscle
13 Superficial branch of lateral plantar nerve
14 Lateral plantar artery
15 Plantar aponeurosis (remnant)
16 Digital synovial sheath
17 Lumbrical muscles
18 Tendon of flexor hallucis longus muscle
19 Flexor hallucis brevis muscle
20 Medial plantar artery
21 Medial plantar nerve
22 Abductor hallucis muscle
23 Calcaneal tuberosity
24 Tendons of flexor digitorum longus muscle
25 Quadratus plantae muscle
26 Lateral plantar nerve
27 Flexor digitorum brevis muscle (cut)
28 Synovial sheaths
29 Plantar arch



Sole of the right foot, middle layer (from below). Dissection of vessels and nerves. The flexor digitorum brevis muscle has been divided and anteriorly reflected.



Sole of the right foot. Synovial sheaths of flexor tendons indicated in light blue (schematic drawing).



1 Proper plantar digital arteries
2 Proper plantar digital nerves
3 Tendons of flexor digitorum brevis muscle
4 Tendons of flexor digitorum longus muscle
5 Superficial branch of lateral plantar artery
6 Deep branch of lateral plantar nerve
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10 Abductor digiti minimi muscle
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12 Common plantar digital arteries
13 Tendon of flexor hallucis longus muscle
14 Insertion of both heads of adductor hallucis muscle
15 Plantar metatarsal arteries
16 Medial plantar nerve of great toe
17 Deep plantar branch of dorsalis pedis artery (perforating branch)
18 Plantar arch
19 Oblique head of adductor hallucis muscle (cut)
20 Medial plantar artery
21 Medial plantar nerve
22 Crossing of tendons in sole of foot (flexor hallucis longus and flexor digitorum longus muscles)
23 Abductor hallucis muscle
24 Origin of flexor digitorum brevis muscle

Sole of the right foot, deep layer (from below). Dissection of vessels and nerves. The flexor digitorum brevis muscle, the quadratus plantae muscle with the tendons of the flexor digitorum longus muscle, and some branches of the medial plantar nerve have been removed. The flexor hallucis brevis and adductor hallucis muscles have been cut and portions removed to show the somewhat atypical course of the medial plantar artery and deep muscles of the foot.

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